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I.

A CONTRIBUTION TO THE STUDY OF THE SECRETING MECHANISM OF THE NOSE.

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The nasal mucous membrane has been an object of study from the beginning of microscopic research, and its secreting mechanism has received attention from physiologists and histologists. Nevertheless, an examination of the literature of this subject, at the present day, presents a confusion of opinion with regard to certain important features, a confusion which is reflected in the text books devoted to diseases of the upper respiratory passages. This has resulted in the employment of the great variety of empiric clinical procedures, of transitory vogue, which one may note in the history of laryngology.

Within a few years, our knowledge of the phenomena of secretion in mucous membranes has been considerably extended, and we are now in a better position to understand the source and nature of the fluid present on the surface of the nasal epithelium.

The object of the following paper is to review our present information concerning the subject, in connection with additional personal investigations.

Among the writers whose names are connected with the early investigations of the subject, may be mentioned Bowman, Schultze, R. Haidenhain, A. Haidenhain, Dogiel, Paulsen, Hoyer and Suchanek.

Without entering into historical details it is sufficient to say that at the present time two views are held with regard to the nature of the glands of the nose. We have, on the one hand, the opinion of Stoehr and Paulsen, that these glands are of a mixed character, containing certain cells which secrete mucus, and others which secrete serous or albuminous fluid. Schiefferdecker believes, on the other hand, that these glands are genuine mucous glands, for the following reasons: In the first place, those glands which are filled with secretion, have entirely the appearance of ordinary mucous glands in other situations. In the second place, glands are found which are almost completely filled with cells containing mucus. He is unable to find any point of distinction between those glands with mucous cells and those without, and he is therefore forced to assume that all cells of the glands are capable of producing mucus. Since his paper was published, the beginning of the channels of the secretion has been studied by new methods, which have thrown much light upon the nature of glandular structures. Up to this time, it had only been demonstrated that acini with protoplasmic cells, occurred in association with those containing mucous cells. It was not yet certain whether a combination of glands occurred, containing mucous and serous cells, or whether the appearance denoted pure mucous glands, with glandular cells in different stages of function. Experience has shown, however, with regard to the glands of the mouth, that it is extremely difficult to distinguish a mucous cell, empty of its secretion from a serous gland cell. On the other hand the newer methods of Golgi have given very valuable results, since with their help a characteristic difference has been discovered between genuine mucous glands and serous glands. The latter possess secreting capillaries, the first do not.

Retzius and E. Mueller have shown that secreting capillaries are a certain proof for the presence of serous glands.

In such glands, one sees in addition to the central lumen also delicate intercellular passages. These passages do not reach the membrana propria. In specimens stained by Haidenhain's hematoxilin and iron, one sees the secreting capillaries as colorless tubules, extending from the lumen between the gland cells. The secreting capillaries appear without walls of their

own, but simply bounded by the upper surface of the cell bodies as tubules imbedded in the cementing substance. Vacuoles are also found, but it is probable that they represent only transitory pictures in the cells which appear when the secretion is present within the cell, but disappear when this is not the case.

In the mucous glands, certain observers have also claimed to find secreting capillaries. If, however, one examines specimens stained by Golgi, and by other methods, he soon becomes convinced that the so-called secreting capillaries of the mucous glands are merely the walls of the mucous cells, seen in profile and direct face view. These are blackish or brown in Golgi's pictures; markedly refractile and dark with specimens stained by hematoxilin and congo red, and very sharply defined. The stained pictures show these boundaries more distinctly in proportion to the amount of mucus in the cells. In cells which have become protoplasmic, the sharp contours disappear. In those which become partially protoplasmic, the sharp contours extend only as far as the mucous zones. This appears to contradict the assumption that we have to do with secreting capillaries in the mucous glands. If this were really the case, the cell boundaries of empty protoplasmic alveoli would be more distinct than in those filled with mucus.

In addition to this point, we notice that whereas the secreting capillaries of the serous alveoli show marked irregularities with regard to their length, their form, and particularly their breadth, the septa of the mucous cells show in all places where they are distinct precisely the same appearance.

The mucous membrane of the larynx has been studied by Sophie Fuchs-Wolfring. She found in all the animals investigated, certain things in common. Everywhere the glands of the larynx and the trachea show two distinct types of acini. One type consists of tall cells with a flattened nucleus resting on its base, staining more or less intensely with mucicarmine or Delafield's hematoxilin. The boundaries of these cells are very distinct, and the lumina of the acini more or less widened, filled here and there with mucus. These are the characteristic mucous glands. In addition to these, we find in the vicinity a large number of glands of totally different appearance.

The alveoli are smaller, the cells are darker, and without refractile surface, the margins of the cells are indistinct, the nuclei are found, with the granular chromatin, the lumina very

narrow. These glands which resemble the albuminous glands, do not stain either with hematoxilin or mucicarmine. In all the specimens of this type there were found more or less distinct secreting capillaries penetrating between the cells. These two types of acini are irregularly distributed. We see, in addition, more or less well-developed Gianuzzi's demilunes, and finally the mucous and protoplasmic cells proper in the same acini, in different degrees of predominance. With regard to the efferent ducts of these glands, we may say that near the orifice on the surface, the ducts are covered with a tall, ciliated, epithelium, which is replaced at a greater or less distance, by a flatter, cylindrical epithelium, which becomes continually flatter and finally cubical.

It was not possible to determine positively whether serous glands occurred independently with their own channels of exit, or whether these always open into the efferent ducts of the mucous glands, and therefore represent lobules or mixed glands.

The glands of the larynx and trachea are thus mixed glands, as demonstrated by the presence of secreting capillaries in the serous acini, and their absence in the muciferous.

In all animals studied, it was possible to follow in these glands, the different stages of function of the muciferous cells in one and the same acinus. All stages are encountered, ranging from the pure muciferous to the pure protoplasmic.

The serous acini discharge their secretion for the greater part, into the mucous ducts. The specimens from the rabbit allow us to suspect, however, that in this animal, serous glands have their own channels of exit.

In all the specimens studied, there were found in addition to independent serous, glandular alveoli, also Gianuzzi demilunes, with serous cells, in which likewise secreting capillaries were demonstrated.

In speciments of pilocarpinised animals all the glands present a picture of marked exhaustion. The glandular cells appear flattened and protoplasmic, the lumina wide. The mucous ducts in the cat, and the secreting capillaries in the rabbit are enormously dilated. The connective tissue is penetrated by numerous lymph corpuscles.

From this presentation of the literature it will be seen that although both forms of glands have been demonstrated in the larynx of man, confusion still exists with regard to the nature of the glands of the nasal mucous membrane of man, and

we are still in the dark as to whether they are to be regarded as pure mucous glands, following Schiefferdecker, or as mixed glands, as stated by Stoehr. Before considering this question further, another important point is to be considered.

In addition to the glands of the nasal mucous membrane, another arrangement is provided for the formation of nasal fluid. This is found in the canaliculi which penetrate the basement membrane. These canaliculi were first seen by Heiberg, who found them also in the larynx and trachea. Later they were found by Chattelier in hypertrophic, nasal mucous membrane, but were not seen with certainty in normal tissues. Schiefferdecker has found them also in normal mucous membrane. According to this writer they are readily recognizable under moderate enlargement, although smaller than the capillaries, and require no especial preparation, although they are naturally more distinct when the basement membrane is completely stained. The basement membrane is found only in the region of the ciliated epithelium or the olfactory epithelium. The canaliculi penetrate the basement membrane, and end free under the epithelium. Usually they run obliquely, and at times present a continuation between the lower epithelial cells, to a higher place which narrows above to a point. The epithelial cells pass smoothly over the peripheral opening, and send nowhere a prolongation into it. Where the canaliculi lie close to each other, they are found separated by at least two to four epithelial cells. They are, however, distributed irregularly without especial reference to their structures. In the canaliculi themselves, and also immediately above and below their openings, one finds frequently leucocytes which have wandered from the adenoid layer below, and have migrated into the epithelium. The prolongations of the connective tissue cells, which lie under the basement membrane, often penetrate into the canals, at times as far as the epithelium, and the darkly stained processes of the cells are readily recognizable in the canals. These canals are more readily recognized in hypertrophic nasal mucous membrane, and are here wider and are connected by transverse canals, so as to present, at times, a branching network. It is also easy to see here the relationship of these canals to the underlying connective tissue. In the latter, the adenoid layer is markedly developed, and one sees numerous thin strands of connective tissue, rising obliquely towards the surface. These strands are separated by light spaces, which contain numerous leucocytes, and pass directly

into the canaliculi. The rows of leucocytes extend likewise directly into these latter.

The above-described light spaces in the adenoid layer are to be considered as markedly dilated channels, but whether in direct communication with the lymph spaces, is uncertain. According to our previous knowledge, it is not probable. The fluid contained in these channels may therefore have a different character from lymph. Probably we have here to do with a fluid containing little albumin, inasmuch as after hardening in Zenker's solution or in alcohol, one does not find evidence of coagulation in the spaces.

With regard to the significance of these basement canals, it is in the first place unquestionable that they permit the passage of leucocytes through the epithelium to the surface.

Schiefferdecker believes that there is a continual passage outwardly of the fluid contained, and that the chief significance of this stream of fluid is to keep the surface of the ciliated epithelium moist. The fluid, therefore, on the surface of the mucous membrane, according to this view, must be composed of a mixture of glandular secretion, the secretion of the goblet cells and the fluid coming out through the basement canals. Schiefferdecker at the time of these observations, however, was unable to find serous glands in the nose, and regarded all the glands as purely muciferous.

After reviewing the preceding literature, I determined to examine the uncut specimens in my collection, and such others, as were, from time to time, accessible to me, with the technique suggested by Retzius, Mueller, and Wolfring, for the study of the laryngeal and tracheal glands.

The following questions were proposed for investigation.

1. What is the nature of the glands in the nose?
2. Is the aqueous vapor which nose imparts to the inspired air, derived from the glands, or from the epithelial surface, between the orifices of the gland ducts?
3. What histologic alterations in the secreting mechanism are found in cases characterized clinically by changes in secretion?

I have therefore reviewed over seventy specimens of nasal tissues, which showed clinically slight or moderate deviations from the normal. It was considered desirable to leave out of consideration for the present cases which showed marked departures from the normal, such as tumors and chronic infections. The technique employed in the examination consisted

in staining paraffine sections in the following stains; haematoxilin and congo red, as suggested by Retzius and E. Mueller, Mallory's triple connective tissue stain, which affords beautiful pictures of mucous degeneration of the cells, in addition to the fibrous elements; mucicarmine as suggested by A. Mayer; muchaematin as suggested by A. Haidenhain. Many other stains were tested, but were found less satisfactory for the present purpose, such as Hoyer's thionin stain and several stains shown by Unna for the demonstration of mucin.

The cases studied may be best classified on the basis of their clinical appearances. The following conditions are comprised:

(1). Normal tissues removed in operations upon the septum.

(2). Chronic rhinitis showing intermittent congestion, and usually an excess of mucous discharge.

(3). Chronic rhinitis with tendency to hypertrophy, either simple papillary or edematous.

(4). Chronic rhinitis with tendency to atrophy.

(5). Vaso-motor rhinitis.

1. *Normal mucous membrane.*

Six cases were examined showing mucous membrane and underlying tissue removed from the septum, in different portions of the region of the quadrangular cartilage. The specimens showed columnar, ciliated epithelium, with a well-defined basement membrane, perforated everywhere by canaliculi, running more or less obliquely. Many of these canaliculi contain polynuclear, neutrophilic leucocytes, fixed in irregular positions, indicating ameboid movement. The basement membrane passes directly into a loose, connective tissue the sub-mucosa of which exhibits irregularly outlined lymph spaces, containing small round cells, in varying numbers. These round cells have the character of lymphoid cells, plasma cells, mastzellen, with a smaller number of polynuclear leucocytes. The glands are situated usually below this lymphoid layer, and consist of aggregations of cells, the majority of which show mucous degeneration. In immediate association with these muciferous cells are others of a protoplasmic character. Close inspection of these protoplasmic or albuminous cells, shows that a certain proportion are disposed to form acini, with narrow, linear, intercellular channels. In the examination of a given field, one finds these glands with capil-

laries, situated as a rule to one side of or below the muciferous cells. These capillaries at times show an irregular course, sometimes with vacuoles near their orifice. From what we know of the serous glands in the larynx and trachea, as previously described, we may conclude that we have here to do with essentially similar glands. We may therefore say the glands in this portion of the nose are composed of chiefly mucous acini, showing various degrees of activity, as indicated by the degree of the development of the mucous degeneration in the gland cells, together with a smaller number of serous acini, which apparently form a separate division of the gland group. In the vicinity of these glands is a moderate, round-celled infiltration, consisting of lymphoid and plasma cells.

2. *Chronic rhinitis, characterized by intermittent congestion, and usually an excess of mucous discharge.*

Ten cases were examined where portions of the soft tissues, covering the lower or middle turbinate were removed. The mucous membrane shows in general, epithelium of the columnar, ciliated type, which at times becomes cubical and occasionally squamous. There is a well-developed basement membrane, perforated by canaliculi, containing leucocytes, as already described in the case of the normal mucous membrane. Below this region the most conspicuous changes are seen to consist in an increased development of the venous sinuses, and usually of the glands. The changes in the glands consist chiefly in an increased size and number of the mucous glands. It was not possible to demonstrate an actual increase in the size or number of the serous glands, and if this existed, it was at least, not conspicuous. The mucous glands showed, as a rule, an increased activity in the mucous changes in the cells, so that in an examination of a given field, the cells with mucous changes outnumbered those of protoplasmic character. There was also a varying increase in the amount of infiltration about the glands.

3. *Chronic rhinitis with tendency to hypertrophy.*

Five cases were examined of simple hypertrophy. By this term is denoted conditions showing clinically an increased size of the middle or lower turbinate, with a smooth mucous membrane, moderately firm on pressure, of an opaque, reddish

color, occurring, as a rule, in adults. In these specimens the mucous membrane shows a somewhat thicker epithelium, with more tendency to disappearance of the cilia, with more frequently cubical cells though seldom of the squamous type. The basement membrane is well defined, and shows numerous canaliculi. Below this region the chief changes are seen to consist in an increased development of the fibrous tissue, and as a rule, of the glandular elements. The venous sinuses are not dilated in proportion. About one-third of the glands consist of the serous type, the remainder of the mucous form, with active and resting cells, in varying proportions.

In the papillary form of hypertrophy the essential changes consist in an irregular mammillation of the epithelium, due to an increased proliferation of the epithelial cells. The basement membrane is well-defined, and shows numerous canaliculi. There is no especial difference noted in the glands from those occurring in simple hypertrophy.

Under the heading of edematous hypertrophy are comprised various degrees of so-called polypoid degeneration, and actual polyp formation. The mucous membrane is usually somewhat thinned, and consists of cells ranging in type from columnar ciliated to squamous, the latter occurring, as a rule, in situations exposed to constant irritation, as the anterior aspect of polypi. The basement membrane is usually a slender, well-defined line, showing canaliculi in considerable numbers. Below this region, there is an evident fibrous hypertrophy, accompanied by edema. The individual connective tissue fibres, appear as delicate, interlacing strands, separated by intervals of varying size, dependent upon the degree of the development of the edema. In this edematous area, glands are seldom encountered. Where they occur, they are usually found in the deeper portions. In these situations they show little or no tendency to increase in size or number. The mucous cells of the mucous glands are usually less frequent than in cases of hyertrophy without edema. The serous cells show no marked alterations in character.

4. *Chronic rhinitis with tendency to atrophy.*

Two cases of genuine, atrophic rhinitis with ozena were examined, which showed characteristic changes in the mucous membrane. This appeared as a thick, compact layer of squamous epithelium, passing immediately to the rete mucosa, with-

out intervening basement membrane. There was little or no evidence of migration of leucocytes through the epithelium. Below the rete mucosa, one comes upon glands, somewhat diminished in numbers and size, about one-third of which have the character of serous glands. The remainder are evidently mucous glands, which show considerable activity, as evidenced by their mucous changes.

In addition to these instances of atrophic rhinitis, several case were examined of dry, anterior rhinitis. This term is used by Ribary to denote those cases of metaplasia of the mucous membrane of the septum, in the anterior part of the quadrangular cartilage, usually associated with a certain degree of convexity of the septum. The mucous membrane shows here epithelium of the squamous type, passing directly into the fibres of the rete mucosa, without intervening basement membrane. There is little or no evidence of the diapedesis in these regions. The mucous glands below are either absent or diminished in numbers. Where present, they are small, and consist chiefly of mucous elements.

5. *Vaso-motor rhinitis.*

Under this heading are comprised those cases, characterized by a profuse, intermittent discharge of watery secretion from the nose, either seasonal or perennial, attended by symptoms of nervous irritation. These cases show cetain striking histologic characteristics in common. The mucous membrane, if not previously subjected to destructive treatment, is of the columnar, ciliated type, underlaid by a well-defined basement membrane, with exceedingly numerous and markedly dilated canaliculi. These canaliculi, as a rule, are crowded with polynuclear leucocytes. In the rete mucosa and sub-mucous connective tissue, there is an unusually marked infiltration of round cells of varying kinds. The sinuses, as a rule, are numerous and well-developed. The glands show about one-third their number to consist of the serous type, the remainder being of the mucous form, either active or resting. There was no characteristic relation observed between the type of symptoms and the nature of the glands. Cases of marked clinical severity, presented the greater increase in the number of and size of the canaliculi, which at times causes the basement membrane, to assume the character of a loose mesh. In these instances, the epithelial cells, immediately above, showed numerous in-

terspaces, filled with leucocytes, while a rapid exfoliation of epithelial cells was apparently taking place.

In reviewing the appearance found in the preceding conditions, we may summarize the histologic alterations as folfows:

Simple chronic rhinitis is characterized chiefly by an increased development of the venous sinuses and of the glands. Hypertropic rhinitis exhibits an increased proliferation of the epithelial or of the connective tissues or of the glands, although these latter, as a rule, play a subordinate part, while no characteristic alterations in the canaliculi are observed. In atrophic conditions, the most important alteration in the present connection consists in the epithelial metaplasia, by which the pervious, columnar, ciliated epithelium and basement membrane is transformed into a dense, compact, squamous epithelium, lying directly upon a compact, rete mucosa. The glands are diminished in number and size, but in a moderate degree, the mucous acini being distinctly alive. In vaso-motor rhinitis, the characteristic alterations consist in a marked increase in the number and size of the canaliculi of the basement membrane, and in the perviousness of the overlying epithelium. With this is associated a marked, round-celled infiltration. The glands show a moderate increase in number and size, but there is apparently no increase in the amount of mucous degeneration, and it was not possible to demonstrate an increased activity in the serous glands.

Before entering upon a consideration of the preceding phenomena, it will be desirable to call to mind the following physiologic facts.

First with regard to the function of the nose, in supplying moisture to the inspired air, we know that a very large amount of aqueous vapor is being constantly exhaled; under normal condition, approximately 500 gr. in twenty-four hours. The greater portion of this comes from the nasal mucous membrane.

It is found that inspired air, after leaving the nose, on its way to the lower air passages, is practically saturated, so far as its own temperature is concerned, irrespective of external atmospheric conditions, whether these be cold and dry or warm and moist. Although the nose is capable thus of nearly saturating the inspired air, it must not be forgotten that the air, after passing the nose, attains a higher temperature in its course lower down in the lungs. We find that expired air is under all circumstances, practically saturated with mois-

ture. It is thus evident that the passages below the nose, contribute this difference in moisture.

It may be said that the nose furnishes about two-thirds of the total amount of water evaporated from the respiratory mucous membranes, approximately 350 gr. in twenty-four hours.

While under ordinary conditions the moisture present on the surface of the nasal mucous membrane is derived from the secreting mechanism of the nose itself, nevertheless, it must not be forgotten that at times, a portion of the nasal fluid comes from the condensation of *expired* aqueous vapor.

The amount of moisture which air is capable of holding depends upon the temperature of the air itself, increasing in direct proportion to increase in temperature. If air, at a given temperature, containing 100% relative humidity is cooled, a definite amount of vapor becomes condensed, and falls as water. This phenomenon may be observed in the nose under certain conditions. During cold weather, the temperature of the nasal mucous membrane is markedly less than that of the air passages lower down. Thus, air passing up from the lungs, saturated with moisture strikes the cooler surface of the nose, and experiences a lowering in temperature, with the result that a certain amount of moisture is deposited upon the mucous membrane. With the next inspiration, a definite amount of this moisture is vaporized, and passes into the lower air passages and is again expired. If the difference in the temperature of the nasal mucous membrane and that of the lower air passages is slight, this moisture in the nose is not perceptible but if the difference be marked, the excess of expiratory condensation over inspiratory vaporization, results in the accumulation of water in the nose in perceptible amount. This is the explanation of the occurrence of watery running from the nose, so common in the winter, in many persons, and as may readily be seen, is more marked in those of poor peripheral circulation than in robust individuals with a good peripheral circulation.

With regard now to the source of these 350 gr. of aqueous vapor, given off by the nasal mucous membrane, it seems probable that the largest portion comes by transudation, through the canaliculi of the basement membrane and interspaces in the columnar epithelium. Evidently the mucous glands can produce little or nothing of consequence, and it would be difficult to understand how the comparatively small number of serous glands could furnish the amount required. Several

years ago in carrying out some investigations on the respiratory functions of the nose, numerous experiments were undertaken by me with regard to the amount of water evaporated from the nasal mucous membrane, under different conditions of external temperature and humidity. It was found that the nose was nearly capable of saturating the inspired air, irrespective of external, atmospheric conditions, whether these were dry or humid. Rapid alterations in atmospheric conditions were tested with the same result. For this reason it is improbable that the glands of the nose played other than a subordinate part in supplying the evaporated vapor. If, on the other hand, we attribute the source of this vapor to transudation through the canaliculi and epithelium, we have the problem at once removed from a physiologic fluctuation in glandular activity to merely an increased or lessened osmosis through the mucous membrane.

We may therefore say that the fluid present on the surface of the nasal mucous membrane is composed of the secretion of the mucous and serous glands, together with a definite proportion of fluid transuded through intercellular spaces of the mucous membrane. With this is mingled a varying amount of mucus, derived from degeneration of the epithelial cells, together with migratory leucocytes, and cellular detritus. Finally under certain conditions of external cold, there is added by condensation a varying amount of water exhaled from the lower respiratory passages.

Under pathologic conditions the glands and canaliculi become altered. In chronic rhinitis, characterized by intermittent congestion and increased mucous secretion, there is found a heightened proliferation and mucous degeneration of the cells of the mucous glands.

In chronic hypertrophic rhinitis, and its various forms, papillary hypertrophy and edematous hypertrophy, there is no proportionate increase in the activity of the glands or in the number of the canaliculi. In atrophic rhinitis the glands are somewhat diminished in number and size, but the most striking alteration is the entire absence of canaliculi in the basement membrane. The transudation of fluid is thus suspended and we encounter therefore a fluid, consisting of mucous and albuminous secretions of the glands, together with a variety of cells and bacteria and their products.

In vasomotor rhinitis, we find an increase in the number and size of the canaliculi in proportion to the severity of the

symptoms. The serous glands show possibly a heightened secretion, but the mucous glands show no evident increase in activity.

As a result of these findings, several therapeutic considerations suggest themselves. In conditions characterized by increased mucous secretion, it is evidently useless to destroy a portion of the epithelium by caustics, unless better drainage or freer respiration are hereby induced. In atrophic rhinitis, the patient does not suffer from lack of mucus, and it is difficult to understand how tablets of mucin could be of service. The ozenic individual is greatly in need of more water in his nasal secretion and on theoretical grounds it would be desirable to introduce substances favoring exosmosis, especially of hygroscopic properties.

Finally we have on theoretical grounds another means of altering the amount of fluid evaporated from the nasal mucous membrane. This consists in increasing or diminishing the respiratory changes in intranasal air pressure. If, for instance, we place a partial obstruction in the anterior nares, the degree of inspiratory rarefaction is increased and transudation of fluid consequently heightened. This may explain the improvement noted in atrophic rhinitis from the injection of paraffin.

On the other hand, removal of anterior obstructions is indicated in cases characterized by increased watery secretion, as in vasomotor rhinitis.

(My thanks are due Prof. Charles S. Minot for facilities kindly afforded me in the laboratory of Histology and Embryology in the Harvard Medical School.)

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II.

SKIAGRAPHY AS AN AID IN THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.

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The employment of the X-rays as an aid in the diagnosis of diseases of the accessory sinuses has hitherto been of little value. The credit of the process about to be described is probably due to Prof. Dr. Killian of Freiburg, a knowledge of whose work was brought to my attention last October by Dr. F. C. Ard, on his return from a visit abroad. Dr Ard brought with him a plate showing normal frontal sinuses and one in which suppuration in one of the frontals could be readily diagnosed.

The only information that we had to guide us in the method of taking these photographs were the statements of Dr. Ard that the patient lay prone on his face, a photographic plate being placed under the forehead and the tube with a compression apparatus placed over the occiput. The time of exposure was stated to be 3 1-3 minutes. Dr. Ard was unable to bring very definite information as to the value placed upon skiagraphy by Prof. Killian.

With this meagre information, I brought the matter to the attention of Mr. E. W. Caldwell, who is the Director of the Gibbs' Memorial X-ray Laboratory at the University and Bellevue Hospital Medical College.

Having no personal experience, whatever, with the use of X-ray my part of the work has been to furnish patients, both dispensary and private, and to interpret the plates made by Mr. Caldwell.

The first photographs obtained gave a fair outline of the cavities but were not so good as those latterly taken.

Mr. Caldwell is at present at work upon an apparatus whereby he hopes to simplify considerably the taking of these pho-

tographs, and should his expectations be realized, he will publish his method.

Up to the present time, we have taken 44 skiagraphs, one of which was of normal frontals for purposes of control.

Since November 1st, 1904, I have performed a radical operation on ten patients whose skiagraphs have been taken. The operation consisted in a complete removal of the anterior wall of the frontal sinus. We were thus able to compare the height and width of each sinus, together with the number, size and position of the septa that these structures show in the skiagraph. While this number of verifications is not sufficient to enable one to interpret all the peculiarities observed in the plates, it suffices for the following conclusions:

First—It is possible by means of a skiagraph to determine the presence or absence of a frontal sinus which extends vertically above the glabella.

As in simple photography a single sitting may not give a satisfactory negative. This may be due to a faulty manipulation of the apparatus, imperfect development of the plate or to the subject having a large and thick walled skull We have a very fair skiagraph of medium sized frontals in a colored woman with a large head.

A frequent source of error results from the rays passing through the head in an improper direction. For example, if the rays enter at a point too far above the occiput a small sinus may not be visible; with the rays entering too low down on the neck, some of the ethmoidal cells or the spenoidal sinuses may be projected upwards so as to appear in the plate in the situation of the frontal sinuses.

The inspection of the plate with reference to the upper outline of the orbital cavity usually shows whether the rays have passed through the skull at nearly right angles to the forehead. There is greater difficulty in getting a satisfactory plate in patients whose forehead is sloping than in those where it is vertical.

One can readily understand the importance to the surgeon of knowing that there is a frontal sinus before he begins his operation. A. Logan Turner from an examination of 240 European crania found "18 skulls or 7½% had no sinuses, while 23 or 9½% had only one sinus." On two separate occasions I have operated needlessly on women, on the right side, for frontal sinus when no trace of one could be found; in each case there was a left frontal sinus. A skia-

graph of their heads would have shown the abnormal development.

Second—A frontal sinus may be small, parallel with the upper, inner margin of the orbit and not detected in the skiagraph.

We made five plates of a man where this condition existed. The skiagraph showed no trace of a cavity in the vertical portion of the frontal bone. There were numerous small polypi in both middle meati. A frontal sinus probe was passed upwards through the naso-frontal duct slightly outwards to a distance of eight centimeters from the lower portion of the vestibule of the nose. From a clinical standpoint there could be no doubt that the tip of this probe was situated in a cell 1.5 centimeters above the inner canthus of the eye. The left frontal region was explored under ether, and no trace of any frontal sinus could be found in the vertical portion of the frontal bone. After passing through the outer table, a vascular, spongy diploe was encountered. On operating, at a depth of 1.2 centimeters, the hard posterior table was met. The diploe was scooped out below and behind the attachment of the nasal bone, when a small, narrow, slit-like cavity, about 1.5 centimeters long and 0.3 centimeters wide was entered. It was lined with a thick, polypoid mucous membrane and contained a small quantity of pus. A probe readily passed through this cavity into the nose. This was the only trace of a cell found in this region. Had the exploratory incision been made through the orbital, instead of the vertical plate of the frontal, this cavity would have been quickly entered.

Third—In all cases of unilateral disease of the frontal sinus verified by operation, we have observed a cloudiness in part or all of the area occupied by the sinus and an indistinctness in the outline of the cavity when compared with the opposite or healthy side.

The appearance is not unlike that of "fogging" in a plate. Whether this cloudiness is due to the presence of pus in the cavity, as I suspect, or to the changes in the surrounding bony walls as a result of the disease, I have not yet been able to determine. It is possible that with an experience, resulting from examining many skiagraphs, the presence of this cloudy area, provided "fogging" may be ruled out, may be an aid to diagnosing frontal sinus suppuration. The same clondiness has been observed in bilateral disease of the mouth.

Fourth—The skiagraph has invariably shown the frontal sinus to be somewhat larger in all dimensions than it proved to be when operated upon.

This is undoubtedly due to the divergence of the rays as they pass from the tube to the plate.

Fifth—A good negative may be depended upon to show the septum separating one sinus from another.

The various incomplete septa that may be present in each sinus are usually shown quite clearly.

Sixth—An oblong, narrow, much darker area, nearly parallel with the upper margin of the orbit on its nasal side, and usually just above it, whenever present, has been found to be an orbital prolongation of the frontal sinus, running anteroposteriorly above the orbit, oftentimes the full depth of the latter.

It is exceedingly valuable to know this prior to operating, as it usually means a more tedious operation in the complete removal of the diseased membrane.

Seventh—We believe that the examination of a skiagraph of the two frontal sinuses when compared with results found on trans-illumination will aid very much in determining the presence of a diseased frontal sinus.

For example: If the left frontal sinus as in our plate, is seen to be nearly as large as the right, but trans-illumination shows a much smaller area of luminosity and a much less brilliant color, we should be strongly inclined to make a diagnosis of suppuration in such a sinus.

Eighth—Skiagraphy may prove a valuable aid in determining our method of treating a chronic suppurative frontal sinusitis.

Given a small sinus with few or no septa: I would prefer to treat such a case by establishing good nasal drainage and believe that in doing so most of them will be cured. On the other hand, if the skiagraph shows us that we have a large sinus with many septa or an orbital offshoot, intranasal treatment is of little avail, and a radical operation should be promptly advised.

Ninth—The sphenoidal sinus.

In one case, two large dark areas near the median line, just above the glabella were for a time unexplainable. Since the nose in this patient has been cleared of polypi, I have been able to determine the presence of two enormously large sphenoidal sinuses. Although we have not yet operated upon

him, I feel sure that those dark areas are due to the projection forward of the sphenoidal sinuses, rather than to any peculiarity in the frontals themselves.

Tenth—A skiagraph may also be of considerable value in determining the height and width of the ethmoidal cell area.

In one of the cases of suppurative ethmoiditis associated with the formation of multiple polypi, the same cloudy appearance of the plate is noticed here as in pus in a frontal sinus. I believe this point to be of considerable value to us as indicating the necessity for thorough curettage and drainage of the ethmoidal cells, in order to effect a cure in such cases.

Eleventh—If the plate can be so arranged as to include the superior maxilla as well, we have noticed that a chronic suppurative process in an antrum presents the same filmy appearance as above noted in similar conditions of the frontal sinus and ethmoidal cells.

A healthy antrum presents an irregular, triangular area, dark in color, with a few light colored septa running through it, many of which are ridges present in the wall of this cavity.

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III.

RADICAL OPERATION FOR CHRONIC SUPPURATIVE OTITIS MEDIA WITH EXTENSIVE NECROSIS IN A PATIENT WITH TUBERCULAR HIP JOINT DISEASE AND INHERITED SYPHILIS FOLLOWED BY TUBERCULAR MENINGITIS—DEATH.

RADICAL OPERATION FOR CHRONIC SUPPURATIVE OTITIS MEDIA WITH ACUTE MASTOID EXACERBATION AND WITH LATENT MENINGEAL SYMPTOMS SECURED LATER FROM MEMBERS OF THE FAMILY—OPERATION IMMEDIATELY FOLLOWED BY LEPTOMENINGITIS AND DEATH.

WENDELL C. PHILLIPS, M. D.

NEW YORK.

Two objects have been in view in presenting the histories of the two cases which I have the pleasure of reporting in this short paper. First, to call attention to the fact that one may happen to operate just at the time when a serious intracranial complication is about to appear, and second that at this time, when so many men are doing large numbers of Schwartze-Stacke and Stacke operations, fatal cases should be reported. Although one was operated upon primarily because of the acute mastoid symptoms, yet, owing to the chronic nature of the disease and the extensive necrosis, a Stacke-Schwartze was performed. Briefly related the histories are as follows:

C. K——. Age, 15 years. Was referred to my clinic at the Manhattan Eye and Ear Hospital by Dr. Daniel Dougherty July 15, 1902. She had been under Dr. Dougherty's treat-

ment for one year during which time he had resorted to the various methods of local treatmest for the relief of a chronic suppurative otitis media. One year previously he had removed a large mass of adenoids. The mass was sent to the laboratory and tubercular bacilli were found.

The patient was undersized and badly nourished. The father died at an early age from dissipation probably complicated with specific disease. Her right ear began to discharge three years ago, while she was under treatment at the Hospital for the Ruptured and Crippled for tubercular hip joint disease, and has continued ever since. There was evidence of pulmonary tuberculosis. Two years later she had an attack of keratitis which was followed by an attack of specific iritis resulting in considerable damage to vision. She had received thorough internal medication for her syphilitic condition. The membrana tympana was almost completely absent and the canal had a macerated appearance. The ossicles, while partially necrosed, were still present. She had been gradually failing in health for some time, but had a fairly good appetite and was able to come to the clinic. It was noted that the discharge was unusually profuse. This and the fact that a prolonged local treatment had failed to benefit her led me to decide upon a complete radical operation. She was admitted to the hospital on the morning of July 22nd, and after preparation a Stacke operation was performed. After reaching the antrum it was found that the mastoid cells were also involved and a complete Schwartze-Stacke operation was then made and all the diseased cells removed. A specimen of pus was sent to the laboratory which showed the presence of smegma bacilli. No tubercle bacilli could be found. The necrotic process had extended through both the attic and antrum tegmen so that the dura was exposed for considerable area. A very thorough curettment was made, during which the malleus and incus were removed, together with large quantities of granulation tissue, after which the wound presented a clean appearance. Hemorrhage was at no time excessive. A Panza flap was made. Up to this time I had had no knowledge of attempts having been made to fill in the exposed areas of bone by the use of skin flaps taken from the surface posterior to the wound. I loosened a tongue of skin and swung it into the antrum region holding it in place by the pressure of gauze packing introduced through the auditory canal. The posterior wound was then closed. A careful examination of

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the exposed dura was made, but it was found intact. However, it seemed considerably congested. The posterior wound was closed by the use of silk sutures. It had been observed that her temperature upon the day of operation was 100.2 and pulse 98. This was the first time her temperature had been taken after coming under my observation. At eight o'clock in the evening it had dropped to normal, with a pulse of 100. The temperature began to rise during the night, and at 8 o'clock in the morning of the 23rd it had reached 100 degrees with a pulse of 102. The dressings had become discolored and the outside ones were removed and replaced. The line of incision of the posterior wound had an unhealthy appearance and a little pus exuded from between the stitches.

On the morning of the 24th the patient complained of considerable pain in the region of the right ear. The dressings were all removed. There was considerable pus coming from the posterior wound between the stitches. These were removed, the wound opened freely, cleaned carefully and packed from behind. The skin flap showed a tendency to slough and was cut away. Her temperature had increased to 101 degrees with a pulse of 120. There was a slight temperature drop at 8 a. m. on the 24th, after which it gradually increased, reaching 102.2 in the afternoon. Under stimulating treatment the pulse became a little stronger and less frequent. At the time of dressing on the 24th the wound was probed in every direction but there was no communication that could be found leading to the brain. On account of the free amount of pus present in the wound a further operation was advised with the intention of exploring the brain cavity. The mother of the child refused to permit any further operative interference. During the 25th the patient complained of severe headache, but there was no paralysis. It was difficult to get a satisfactory examination of the eyes owing to the results of her keratitis. At this time the odor from the discharge became somewhat marked. During the remainder of the 25th, 26th, and 27th the temperature ranged from 102 to normal. The normal temperature, however, was observed only at noon on the day of the 27th, at which time the pulse was 90. There was no vomiting, no chills and the patient was conscious and talked freely. Wet dressings were now used and changed four or five times daily, and the wound was thoroughly cleaned out each time. The swelling and edema about the wound had gradually subsided. On the 28th the tempera-

ture began to rise and by 8 o'clock in the evening had reached 104 degrees, the pulse, however, did not materially increase in rapidity, but was somewhat weak. On the 29th there was a reduction of temperature ranging at about 102 degrees with a pulse of 80 to 100. There was less discharge, but the wound seemed to be sloughing and had an unhealthy appearance. The patient complained of a good deal of pain, and there was marked loss of appetite.

Dr. Wm. M. Leszynsky, the consulting neurologist of the hospital, was called in and gave it as his opinion that she was suffering from tubercular meningitis.

On the afternoon of the 31st the temperature again reached 104 degrees, which gradually subsided, and on the morning of August 1st it became normal once more with a pulse of 80. She became somewhat stupid, complaining of severe pain in the head and excessive discharge. She gradually became weaker and finally became entirely unconscious, and during the afternoon of August 2nd her temperature rapidly arose until the time of her death, 9:30 p. m., it had reached 106.6. All efforts to secure a postmortem in this case were futile.

CONCLUSIONS.

1. This was a clinic case and the temperature had not been taken until the morning of operation, when she came into the ward. In the light of the subsequent history she probably had temperature variations for some time. There was, however, no other marked symptoms of intra-cranial disease.

2. Beyond the possible influence of the shock of the operation it would seem that the course of the disease would have been about the same with or without operation.

A. M—— Age, 21. Came to my clinic at the Manhattan Eye and Ear Hospital March 23, 1904. Had diphtheria at three years of age, which was followed by suppuration of both ears. The suppuration became chronic and had continued for eighteen years. There was odor from the discharge on both sides. The hearing was practically gone in both ears and she complained of some tinnitus. There had been pain in ears at intervals, and there was at this time very slight tenderness over both mastoids, more marked on the right side. There was no record of a subsequent call for treatment until March 28th. Upon that date she consulted Dr. Neres, to whom she

had been assigned for treatment, at his office, and complained of severe pain in the right mastoid region. She had been unable to sleep during the previous night, and had the appearance of one who was suffering severely. It was noted that she had facial paralysis of the right side, which she stated had come on suddenly two days previously. She was admitted to the ward on the afternoon of that date. The ward history states that she had had pain in the right ear on and off since four years of age, the attacks having been of a neuralgic nature. A few days previously she had a severe cold which had resulted in a good deal of increase in the discharge. There was free discharge from the canal and entire absence of both drum and ossicles. There was slight tenderness on deep pressure over the right antrum, the facial paralysis being marked. A smear from the right ear showed mixed infection.

March the 29th at 3:30 p. m. a Stacke-Schwartze operation on the right ear was performed by Dr. F. E. Neres. The attic and antrum were filled with a tumor-like mass which was quite firm. The middle ear also was entirely filled with granulation masses. Neither the dura nor lateral sinus was exposed at any point. All was thoroughly cleaned out and a Körner flap made. The posterior wound was closed with silk sutures. The temperature at the time of operation was 99 and the pulse 110. She had slept fairly well the night before, but complained of pain in the right mastoid region. Previous to operation her ear had been douched freely with bichlorid solution 1-5000, and she had been given two grains of calomel followed by a saline. She slept fairly well during the early part of the following night. Toward morning she vomited freely a greenish liquid and complained of severe pain in the lumbar region. Her temperature, however, did not go above 99 degrees, pulse 110 respirations 24. The pulse was weak. The facial paralysis remained the same as before operation.

At 4 p. m. on the 31st the temperature began to rise and by eight o'clock it had reached 104 degrees. The pulse was intermittent 110.

On the 30th a specimen of urine sent to the laboratory showed a specific gravity of 1030 with no albumen, but slight trace of sugar.

On the 31st catheterized at 8:15. A specimen sent to the laboratory showed a specific gravity of 1024, with a large amount of albumen and some sugar. The microscope revealed granular, hyaline and epithelial casts. The dressings were re-

moved at 10 a. m. and the ear was repacked with iodoform gauze and there was no sign of pus or extension of infection. The temperature arose gradually until it reached 105 degrees and the pulse became weaker. The patient became unconscious. Further operation was refused by the family. She was given strychnin and morphin at intervals, and once or twice doses of nitroglycerine. She died at 1:30 p. m, April 1st. A postmortem could not be obtained.

During a conversation with the mother during the last day of the patient's life, it was learned that about two weeks previous to the date when she came to the hospital she had had a severe attack of vomiting of a projectile character with violent headache and partial loss of consciousness, which had lasted for two or three hours. The family physician had told them that it was a bilious attack, so that they had not in any way connected the occurrence with her middle ear disease. The complete Stacke-Schwartze operation was performed on account of the very chronic nature of the disease.

CONCLUSIONS.

1. The acute exacerbation of mastoiditis in this case was sufficient cause for operation.
2. The chronic character of the suppuration justified the radical operation.
3. The paralysis, while considered due to either local pressure or extension of necrosis should have led to more serious consideration of possible meningeal symptoms, which were not discovered until after operation.
4. It is not probable that beyond the effects of shock the operation had any influence upon the course of the meningitis. It is to be regretted that no postmortem could be obtained.

IV.

SOME FURTHER REMARKS ON THE CASE OF CHOLESTEATOMA PRESENTED AT THIS SECTION A YEAR AGO.*

By W. H. Dudley, M. D.,

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It may be recalled that in the discussion following the reading of the paper referred to, "Cholesteatoma with report of a Case," || at the meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society at Fall River one year ago, the question of dealing with a large cavity left after the removal of the tumor came up, and some suggestions were offered as to the proper method of disposing of it. It may be remembered that after removing the mass of cholesteatoma there remained a cavity measuring eight centimeters antero-posteriorly, seven centimeters vertically, and two to four centimeters deep, exposing a large surface of dura which positively refused to granulate and fill up by any process resorted to, and they were not few. Fig. 1 shows the opening into the cavity which existed at that time. It had been learned by experience that by frequent irrigation the parts might be kept clean, but if left to themselves even for two or three days, the lining membrane, which looked not unlike a dry mucous surface, began at once to be covered with a material resembling that removed at the operation, and at once underwent decomposition.

In the discussion of the paper it was suggested, among other methods, that the inner surface of this cavity might be covered with Thiersch grafts, and a radical operation performed, and the outer opening closed. Accordingly, an attempt was made to get some grafts to take hold of the outer surface of the dura. This membrane was scraped till a raw, clean surface was produced and a fair sized Thiersch graft applied in the usual manner, but it did not adhere. Feeling that perhaps something in the technique was at fault, the procedure was re-

*Read before the Eastern Section of the American Laryngological Rhinological and Otological Society, at Philadelphia, February 4th, 1905.

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peated some three or four times; each attempt was made more careful and painstaking than before, but the result was the same.

At this time, at the suggestion of Dr. Dench, who kindly examined the case, an attempt was made to obliterate the cavity by removing all the bony covering of the cavity, and at the same time to do a radical operation, uniting the cavity with that of the middle ear. This was accordingly done, which

Fig. 1.

resulted in removal of the cranial bones over an area of about forty-five square centimeters. The edges of the old opening were freshened, the scalp was dissected well from the pericranium upward for about three centimeters, for the purpose of preventing too much tension on the sutures, and the parts brought together with interrupted sutures, with the intention of irrigating and keeping the cavity clean while union was taking place, and at the same time firm pressure was made on the soft tissues behind the ear, in order to secure, if possible, adhesion of the soft tissues to the dura. A few weeks of this

treatment demonstrated two things: First, that the cicatrix formed by bringing the superficial parts together was becoming very thin, and was soon followed by an opening into the cavity behind the ear. This condition continued until the opening reached the size of twenty to twenty-five millimeters in diameter; and inspection now showed further that there had been no attempt at union between the dura and the tissues covering it, but on the other hand, the same kind of membrane covering the dura was also lining the proximal surface of the outer tis-

Fig. 2.

sues. As the superficial tissue since the second operation had been kept pressed in upon the dura, or as nearly as is possible in approximation to it, the cleft remaining was very narrow, though nearly as extensive otherwise as before. This inner surface remained clean as long as it received frequent irrigation, but if left more than three or four days would be covered with a membrane brownish in color, with a great disposition to decompose. It was now felt that union between the outer surface of the dura and the overlaying soft tissues was ex-

ceedingly improbable, and it was thought best, therefore, to close the opening and to instruct the patient to keep the cavity clean by occasional douching for whatever length of time the case might demand. Accordingly the whole side of the head was shaved, the edges of the opening were freshened, and a piece of the scalp was dissected from the parietal region extending about seven centimeters above the opening and brought down and sutured below and in front, while it was left free above, that there might be no traction on the cicatrix. The sliding down of the whole scalp from above left a triangular space of uncovered pericranium about four centimeters wide at the base, by eight centimeters long. This was filled in with Wolf grafts taken from the thigh. No disturbance followed the operation. The patient was up in four or five days and left the hospital in about a week. The wound united everywhere by primary union, and although a part of the graft sloughed, the ultimate result was very satisfactory, and the patient able to return to work in about four weeks. The appearance at this time is represented by Fig. 2.

During the second operation in removing the rather large area of cranium, in order to uncover all of the dura affected by the cholesteatoma, it was found necessary to extend the operation forward practically to the auditory canal, removing the whole of the mastoid tip. At this time the face was watched carefully to note any signs of injury to the facial nerve, but none was observed; nevertheless, after coming out from the ether, as was expected, he had complete paralysis of that side of his face. Taking into account the amount of bone removed, it was believed that not only must the facial nerve been injured, but that in all probability a considerable portion of it removed.

Since the recovery from the last operation the patient has presented himself from time to time for observation; the paralysis has now largely disappeared, although not entirely—he says he can do everything but "whistle and spit." The douching still brings away small shreds of cholesteatomatous lining of the cavity, though it is becoming less and less, and it now seems possible, at least, that the mucous lining of the tympanum may extend backwards and by degrees displace the unhealthy lining of the cholesteatomatous cavity, which, if it should occur, will place this surface in an ideal condition. His hearing on this side is now for watch 12/70, and loud whisper 10 feet.

DISCUSSION BY E. B. DENCH: I saw that case. The results which Dr. Dudley has obtained are most admirable. I have never seen a plastic operation which was more satisfactory. It is surprising what results you can get with a great loss of tissue. I have been astonished what good results could be obtained in secondary operations by means of the sliding flaps. We are sometimes deterred from this by the fear that the cicatricial tissue will slough. I have found that these cases close up admirably.

V.

REPORT OF A CASE OF MYCOSIS OF THE THROAT TREATED BY THE X-RAY.

By Lee Maidment Hurd, M. D.,

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The prime etiologic factor in so-called pharyngo-mycosis is yet to be found. The old theory, that the leptothrix buccalis is the cause, has been doubted by Siebenmann, Brown, Kelly, Goodale, Kyle, Richardson and others. I think it has been fairly conclusively proved that the condition is a keratosis, and that this keratosis seems to be caused by some local irritation; whether that irritation is the lepothrix or something else we cannot say. Pharyngomycosis is not as rare a disease as the text books would lead one to believe. I averaged about six cases a year out of about 1,200 clinical cases, but most of them come to be relieved of conditions other than those due to mycosis. And there is no reason to interfere in this condition unless it gives rise to annoying symptoms, but when the mycosis causes uncomfortable symptoms of the throat we are generally face to face with a seat of obstinate disease, which is plainly shown by the long list of remedies recommended for its relief. And of this list, the galvano-cautery seems to be the best; but when in an extensive case, like the one I am about to describe, the treatment seems a little too heroic.

Under the supposition that the X-ray would have a beneficial effect on the abnormal condition of the surface epithelium and if the keratosis was due to the leptothrix, the germicidal properties of the ray would make it still a more potent remedy.

I regret I have only one case to report, but it was over a year after I thought of using X-rays before I found one appropriate for the trial, and I have not seen another since in which the symptoms were severe enough to justify the time and expense for treatment with the rays. I therefore report this case, fully realizing that one case proves nothing, but in the hope that it may lead some of my colleagues to try it in a similar case,

thereby demonstrating whether or not the X-ray is of service.

J. R., age 30, male; occupation a medical student, consulted me May 25th, 1903, with the following symptoms: For the past three or four months the larynx and the pharynx felt raw and stiff, and these symptoms were increased with every spell of bad weather. Pain in the left ear with some diminution in breathing. He was hoarse and his throat felt full especially after using his voice. Repeated attacks of acute laryngitis were common. Both Eustachian tubes felt closed at times, the left one most of the time. He first noticed white tufts on his tonsils and postpharyngeal wall about three months ago. His teeth are in good condition. He does not use tobacco or alcohol. He sleeps in a dark room, and the only condition that might be an etiologic factor is a chronic gastritis, which he has had for some years, and which is better at present; but otherwise his health is good.

Examination: The tonsils are flat, fibrous and recede behind the anterior pillars. Large white tufts are numerous on the tonsils, also on the postpharyngeal wall and extend upward on the left side into the mouth of the Eustachian tube. The lingual tonsil is nearly covered with patches of larger size and a few tufts are located on the aryteno-epiglottic fold of the larynx and extend to the false cord on the left side.

Treatment: Only the X-ray was used; at first ten-minute sittings, twice a week, for six weeks. The pain and discomfort diminished after the first few exposures, and after the fourth some of the smaller tufts became soft and could easily be wiped off with a cotton pledget. The small patches began to disappear, and at the end of six weeks the patient went to the country for the summer, with instructions to lead an open-air life as much as possible.

He returned three months later, September 30th. The condition had remained stationary since he was last seen. He again went under treatment with the X-ray, ten-minute sittings, three times a week, and by the end of November nearly all the spots had disappeared. Then the time between exposures lengthened to twice a week, and by the end of December no spots could be found.

The tonsils and pharynx were directly exposed to the rays through a speculum, something like a Fergusson vaginal speculum, with a large flange to protect the face from the rays. The lingual tonsil and larynx was treated with the rays from the outside, through the tissues of the neck.

In all he received forty-one treatments, of ten minutes each, a medium tube with a spark gap of about three inches being used. Most of the applications were made through the tissues of the neck. The X-ray was administered by Dr. Frank B. Carpenter, 616 Madison avenue, New York City.

The patient had no return of the mycosis and has been free from attacks of laryngitis, up to the present time.

This disease subsides spontaneously sooner or later, and this case may have been treated just as the subsidence was about to take place, but the fact that his throat began to feel better after each exposure to the ray, leads me to believe that X-ray was the cause of his improvement.

15 East Forty-eighth Street.

VI.

TECHNIQUE OF THE RADICAL OPERATION FOR CHRONIC SUPPURATIVE OTITIS MEDIA.*

By John D. Richards, M. D.

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It is scarcely necessary more than to allude to the fact that the operation in question is one of the most beneficent in modern surgery. At the same time it is one of the most difficult, and there are few procedures which depend more for a successful issue upon careful attention to the detail of technique. It is from this source that any further advancement in the operation may be expected; it is upon this basis that the operation has reached its present high degree of efficiency.

There are a few points in the technique of the operation as here described, which I have not seen advocated and which may be of some slight advantage. The sterilization of the field of operation, instruments, etc., and the preparation of the patient, we are all familiar with, and therefore their recital is unnecessary.

If a curved line is so placed that one extremity is at a point immediately above the mastoid tip, the other at a point on the scalp corresponding to the top of the pinna, and its center passes through a point about one inch posterior to the line of auricular attachment to the head, a proper incision will have been outlined. This incision is not bounded internally by the bone excavation but is posterior to it, two advantages resulting, namely, that should granulations sprout in the line of incision they do not project into the bone cavity; and what is more important, should infection occur in the line of section, the bone cavity is not involved. The resulting scar of this incision is inconsiderable, and in its major portion corresponds

*Read at the meeting of the Eastern Section of The American Laryngological, Rhinological and Otological Association, Philadelphia, February 9, 1905.

to the hair line or is within it. Better apposition of the lips of the wound is obtained when the section is made far back, as it is then "bolstered up," or splinted, by the even surface of the mastoid cortex. This is an important point and has a direct bearing upon the size of the resulting scar. The approximation of the lips of the wound can be made with nicety when the section is so placed.

When the incision is made near the line of auricular attachment to the head, the lips of the wound having no support, tend, when sutured, to invert into the bone excavation; nor does this tendency cease even if we overcome it, at the time when the sutures are tied. The gauze packing in the bone cavity does not form an even and firm support, and pressure from without by the bandage is continually exerted upon this irregular base. Not only will the resulting scar of this incision be generally larger than that of the incision placed further back, but in addition it shows a tendency to become depressed.

Careful observation will also establish the fact that the section when made close to the line of auricular attachment to the head is more likely to suppurate. When infection occurs, with the incision so placed, the bone cavity is at a decided disadvantage, and the whole wound not infrequently must be opened.

The knife should sink to the bone all along this curve, except in that part above the posterior zygomatic root; here only down to the temporal fascia. To sever the temporal muscle is unnecesary, as with a hoe-shaped (Langenbeck's) periosteal elevator, the muscle can be retracted upward without injury. The division of the temporal muscle contributes little to the forward displacement of the auricle. To sever the cutaneous structures only, and to avoid cutting the muscle, grasp the pinna of the ear between the thumb and first finger, and, while making the incision in its upper portion, pull the auricle in a direction from the head, thereby lifting the adjacent scalp from its base, the temporal fascia and muscle. The disadvantage of dividing this structure arises when infection occurs. To this accident we are always liable, for in this operation our asepsis is but relative.

On several occasions, I have seen a complete undermining of the temporal muscle, this structure resting upon a bed of pus, and in one of these cases considerable portions of the muscle were cast off as slough. When the temporal fascia

and muscle are undivided the fascia acts as a shed to any superficial infection; when severed it is as a roof that has a hole in it. Suppuration occurring in the planes of the temporal muscle affords an ugly complication, and the division of this structure predisposes the auricle to sag.

The next step is to displace the auricle and flap forward. In doing this the periosteum should not be torn but preserved in its entirety, for the semilunar flap attached to the auricle forms in part the outer wall of the bone cavity, and, when its periosteum is sacrificed, its inner surface facing the bone excavation later becomes a mass of exuberant granulations over which the process of epidermization advances but slowly.

The posterior lip of the curvilinear incision should not be retracted.

The indiscriminate clamping of every oozing blood vessel paves the way for non-union in the postauricular wound. Bruising of tissues should particularly be avoided, and with the retraction of the auricle, the majority of bleeding points will cease without ligation. Those that do not may be tied. Catgut ligatures should be used sparingly. Before the final suturing of the wound, after reaction has been discontinued, every vessel which at this time bleeds should be ligated, particularly if skin grafting is to be done at the time of operation (a practice which I do not advocate.)

The cartilagino-membranous canal is next separated from the bony canal, and some gentleness is necessary to avoid tearing the soft tissues. A periosteal elevator or a pair of small blunt-nosed scissors serves this purpose. At this period of the operation, an ordinary sharp retractor is best for holding the detached auricle and flap forward. A strip of gauze introduced through the membranous canal and brought out through the postauricular wound may be used for this purpose, but the cartilagino-membranous funnel is usually torn when the gauze strip is used.

Before proceeding with the bone excavation, we should inform ourselves of the depth and general direction of the auditory canal, ascertaining whether its axis assumes a more vertical or horizontal position than usual, *i. e.,* if the canal "looks" upward and inward, or directly inward. By this, we gauge in a general way the direction in which we should excavate, and get some idea of the depth of the excavation. The removal of bone should be commenced by enlarging with the gouge the postero-superior arc of the bony meatus backward, low-

ering the postero-superior canal wall simultaneously as the excavation is carried inward. This method is advocated instead of that by which the antrum is entered primarily for the reason that by removing the postero-superior canal wall as we proceed inward we utilize it as a guide and cannot miss the antrum. By its removal we create in the beginning of the operation the maximum amount of working room, and by removing the bone from the meatus backward the most favorable route is chosen for avoiding the sinus.

The attempt which we often witness to outline upon the surface of the mastoid the limit of the bone excavation is, in reality, an unconscious effort to prognosticate the limits of the antrum and to prejudge the amount of involvement. It is a waste of time for no other purpose than the indulgence in a guess, and unfortunately if the operator takes this attempt seriously and begins removing the bone near the posterior confines of this mapped out area, instead of working from the meatus backward, he not infrequently enters the sinus or exposes the cerebellum. As a rule the exposure of dura brings with it no evil results, and our admiration for its ability to resist invasion so increases with our familiarity with it, that unconsciously we reach that point where we cease to regard it as an accident. We are in error; for, during the observation of any considerable number of operative cases, there will invariably arise instances of meningitis or intracranial infection, whose origin can be traced to no other palpable source. In children, in whom the membranes are less firmly knit and the avenues of communication with the endocranial lymph sac more open and relatively abundant, dura exposure becomes significant.

The practice of entering the antrum primarily, later removing the posterior bony canal wall, is an unwarrantable procedure, and next to the original Stacke operation, is, at the same time, the most dangerous and inconvenient route that can be chosen, working as we are upon mastoids in which the ordinary relations are notoriously disturbed, performing an operation in which injury to the sinus constitutes an absolute inconvenience, and attempting to reach an unknown location (the antrum) through an insufficient opening, placed at an uncertain point, and without a guide.

If at this period of the operation, *i. e.*, before the antrum is opened, the upper margin of the bone excavation is not carried higher than the roof of the auditory canal, we avoid

the middle fossa. Having once entered the antrum, the upper limit of the bone cavity can be raised until it becomes tangent to the floor of the mid-cranial fossa by removing the over-hanging bone which represents the superior portion of the external antral wall. The lower limit of the mastoid excavation should slope down by an even curve into the floor of the auditory canal.

As the excavation in the bone is carried inward, (and it is always safer to lower the roof of the cavity in advance of its floor, on account of the external semicircular canal and vertical portion of the facial) the antrum, being more superficial than the tympanum, will be entered first. A bridge of bone will then be left separating the mastoid excavation from the inner end of the auditory canal. This bridge represents the extreme inner end of the posterior canal wall and in part the tympanic ring.

A hook-shaped probe then introduced into the antrum and passed through the aditus, its point emerges through the opening in the drum membrane into the inner end of the auditory canal, and in its concavity is held this bridge of bone referred to, and with the removal of which, the antrum and tympanum are merged into one cavity. As the antrum is entered, a bent probe should be made use of to ascertain the limits of this cavity. To have at all times the maximum amount of working room is a desideratum, and we at once enlarge the excavation backward, removing the over-hanging bone as far posteriorly as the probe has revealed the posterior limit of the antrum to be. Superiorly we ascertain the amount of over-hanging bone included between the upper limit of the excavation and the roof of the antrum, *i. e.*, the floor of the mid-cranial fossa, which is our upper limit, and we remove this. We then have the maximum amount of working room through which to attack the tympanum and to remove the "bridge" previously mentioned.

For the enlargement of the excavation outlined above, I know of no instrument which is comparable in safety to the strong round curette, to be used in increasing sizes as the excavation is enlarged. The rim of the bone cavity affords the proper fulcrum, under which circumstance the curette becomes one of the most powerful instruments in the mastoid kit, capable of being used to advantage even in bones of extreme density. The removal of the "bridge" is next to be effected. For this purpose the Jansen forceps has been devised. The

operator skilled in the use of the chisel would, however, scarcely lay aside this instrument to use the forceps; and the same may be said of those accustomed to the curette. My own preference is for the latter instrument. The cutting edge of the curette is placed beneath the bridge, its back faces the internal wall of the aditus, the posterior margin of the excavation gives fulcrum, and by twirling the cutting edge of the instrument through a semicircle, the bridge of bone is easily removed and without danger to other structures, for we are working in a direction which is from within outward, and in this respect the curette is safer than the chisel. At this period of the operation, *i. e.*, during the removal of the bridge, injury to the facial nerve is altogether unnecessary, and moreover is but rarely committed; it is later that the nerve more commonly suffers, and the use of those variously devised instruments for its protection decreases proportionately to the operator's familiarity with the anatomy of the parts; their elimination is a step toward simplicity, and should be encouraged.

The bridge having been divided, the resulting isthmus is widened at the expense of the bone representing its upper pillar, until this superior pillar has been made to recede upward to the under surface of the mid-cranial fossa. With a small curette the remnants of the ossicles (with the exception of the stapes) and the membrana tympani are swept out into the trough of the bony canal, and removed; they may be extracted with the forceps, if visible and present.

Owing to the bleeding from the granulations in the hypotympanum and those in the region of the tube, considerable time is saved and the necessity for sponging lessened by early removing these granulations with a ring curette, and filling the tympanum with adrenalin. The assistant's duty of sponging the tympanic cavity and keeping it cleared of blood, is not an altogether unresponsible trust. A visit to the dead-house, if we choose to make the experiment, will soon convince us that in the act of sponging the stapes is dislocated or driven through the oval window with far more frequency than is generally supposed. To this is often due that dizziness and vertigo which is occasionally to be observed after such operations, and in which injury to the semicircular canal and the structures of the inner tympanic wall has not been committed by the operator. To prevent this accident, it is advisible to diminish as far as possible the amount of sponging, by early removal of granulations and the use of adrenalin and

the complete lowering of the "inferior pillar," *i. e.*, the ridge overlying the vertical portion of the facial nerve and also protecting the stapes, should be reserved as a later step of the operation, the assistant being required to sponge over this ridge from the direction of the mastoid excavation, and not through the bony canal.

The external attic wall should next be removed. With this a distinct advance was made in the technique of the operation. When this ledge is allowed to remain it often conceals diseased pneumatic structures which keep up a protracted suppuration. Particular attention should be paid to the extreme anterior end of this ledge; it should be thoroughly removed and not allowed to remain as an irregularity in the upper and anterior portion of the vault of the cavity. The dome of the excavation as it curves forward should pass insensibly into the curve of the inner end of the anterior wall of the auditory canal, it should be smooth and even, with no irregularities, and all pneumatic structure should have been removed.

The next step is the lowering of the "inferior pillar," *i. e.*, the ridge which overlies the vertical portion of the facial nerve, and sometimes is referred to as the facial ridge. The failure to sufficiently lower this is responsible for many an unsuccessful outcome. When left high it shuts off the mastoid excavation from the tympanum to such an extent that proper drainage of the former cavity is not secured; secretions stagnate therein, profuse granulations arise, and the posterior portion of the cavity is cut off from inspection.

As we dress the wound through the meatus we are forced to pack the mastoid portion of the cavity over the brow of the hill. As the patient lies in the operative position (except in anomalous positions of the nerve, which are rare) this ridge from the floor of the aditus to the floor of the auditory canal, can be safely lowered till level with the summit of the external semicircular canal. For this purpose I prefer a broad, round-nosed curette with its cutting edge turned slightly backward. We occasionally see the rongeur used. This is of all instruments the most dangerous in this locality, for the ridge is composed of exceedingly brittle bone and often fractures far beyond the bite of the forceps, the fracture not infrequently involving the Fallopian canal.

By holding the curette vertically, placing its nose upon the summit of the external semicircular canal, using the superior

rim of the bone cavity as a fulcrum, and working toward the tip, the ridge can be shaved down to the desired level with the utmost ease, and the danger of injuring the nerve is practically eliminated; for the plane of action of the curette is either parallel to the course of the nerve or else in the direction from it, and the cutting edge is (if the instrument be held vertically) slightly above the convexity of its nose. Even though the nose of the instrument rests upon an exposed nerve, that structure is practically insured from being cut across. Not only is the curette more effective here than the chisel, but, what is more important, it is immeasurably safer.

Even in anomalous positions of the nerve, in which the nerve in its vertical portion rises superficially, and is consequently more oblique, there is, when using the curette as above described, but little danger of injuring it. The intratympanic horizontal portion of the Fallopian canal is always to be seen at this period of the operation, and if we choose we can follow the nerve in whatever direction it may take, exactly as we would a blood vessel after having once found it. The danger of the chisel is that we have to work from without, inward, never knowing that the nerve may not be at the point we are chiselling. The safety of the curette lies in the fact that we see the level of the nerve, or rather a point immediately above it, the external semicircular canal, and commence the removal of the superimposed ridge from that point, working from within outward. I have never seen a nerve paralized by the curette when used in the manner above described. Owing to the small, pit-like character of the cavity when the chisel is used for shaving down this ridge, its action is not only from without inward—the direction of danger—but from the nature of the instrument, the plane in which it cuts, if continued (as by a slip) crosses the course of the facial nerve. For any instrument to embody the quality of safety, its action must be parallel to the course of the nerve, and the chisel cannot meet that requirement. So far as I have been able to observe, the advocates of the chisel are forced to either of two disadvantages:

First, in order to insure a proper lowering of the ridge, the mastoid excavation is unnecessarily enlarged, and for no other reason than that the instrument can then be used at a safer angle, *i. e.*, in a direction more nearly parallel to the course of the nerve. This is one reason why many advocates of the chisel insist upon making an unnecessarily large mas-

toid excavation, even though the vertical process of the mastoid is in no way involved. It secures a large amount of working room which, for the safe use of the chisel in the locality above referred to, is a necessity; but this delays epidermization.

Secondly, if the limits of the cavity are confined to their proper proportions, it is with great danger to the nerve that the ridge can be lowered to its most advantageous level with a chisel, and this requirement is more rarely met with than it should be. Not that recoveries do not occur with the ridge improperly levelled, but it is to commit an error of technique which, if persisted in, will contribute in a series of cases its percentage to the failures. When, for instance, the hypotympanic space is deep, lowering of the ridge to its absolute limit becomes a necessity.

The inner end of the floor of the auditory canal should be lowered until it recedes to the level of the floor of the hypotympanum; in other words, the external wall of the hypotympanum should be removed. As the cavity is then dressed through the meatus, its floor in all its parts is open to inspection, the round and oval windows are easily to be seen, and there is no portion of the cavity shielded from the eye. The failure to remove the external wall of the hypotympanum is a common but grievious error; depending upon the depth of the hypotympanum,* which varies with the individual bone, secretions effectively stagnate, a pit for concealed granulations is afforded, and the cavity justly deserves its name "the cellar."

Immediately posterior to the round window and in a posterior portion of the hypotympanum, there are often to be found pneumatic cells, which, if the external cellar wall is not removed, remain hidden and keep up a protracted suppuration. These cells, after the above requirement has been met, may be removed under direct inspection, and the danger of injuring the nerve is thus lessened.

For the lowering of the inner end of the floor of the auditory canal, both the chisel and the gouge are eminently instruments of danger for the reason that this bone is intensely hard and brittle, it requires considerable of a stroke of the mallet to engage a bite of it, and to remove it, and when it gives it does so with a suddenness. The point of the instru-

*Politzer: "Inferior Tympanic Cavity." Kretschmann: "Cavum hypotympanicum." Grunert; Koerner: "Cellar." Extends from the inferior border of the sulcus tympanicus to the floor of the tympanum.

ment, directed from without inward, may, if by chance the chisel slips or the stroke of the mallet be misjudged and in excess of that needed, produce injury to the following structures: the dome of the jugular bulb, the facial nerve, the joint of the inferior maxilla, the structures of the internal tympanic wall; and at times the carotid artery is not so very far distant. Each of these accidents, with the exception of the latter, I have seen occur to experienced manipulators of the chisel. The most common injury is to the facial nerve. A safer instrument by far is a round curette with its cutting edge turned slightly backward, to be used from within outward, in a direction away from the structures mentioned above. Provided the instrument be used as a cutting instrument and not as a pry, it works admirably.

A factor which on paper seems unworthy of note, but which in actual experience often amounts to a handicap, particularly to one who operates but infrequently, is that at this period of the operation the fingers by constant holding of the chisel have become tired and cramped, and are incapable of their best effort at a time when this is most needed.

It not infrequently happens that the floor of the auditory canal presents about its middle, from without inward, a marked convexity. Particularly is this true of those canals whose antero-posterior diameters are short, in other words, in a canal the cross section of which represents an ellipse with its long axis inclining to the vertical. This hump should be levelled, otherwise, as we view the cavity through the meatus, the floor of what was the hypotympanum remains hidden from view.

The next step is to widen the floor, or trough, of the auditory canal at the expense of the base of its anterior wall. In some instances this is unnecessary, but in others the anterior wall of the auditory canal presents a marked convexity backward, so that in attempting to see the region of the tube through an artificial meatus of moderate size, our view is hidden by the curve of the anterior canal wall. This wall is an exceedingly thin, brittle partition of bone separating the lumen of the auditory canal from the joint of the inferior maxilla. A vertical section will, however, reveal the fact that the partition is thicker at its base than at a point higher up.

With a sharp, round curette it is possible to gain (and with safety) considerable space by removing thin shavings of bone from the prominence of the convexity, and particularly

from the base of the anterior wall of the auditory canal. It is surprising to see how much the field of view can be enlarged with the removal of a minute shaving of bone, and until every portion of the bone cavity has been made easily accessible to the eye through the meatus, we have fallen short of a proper ideal. My reason for advocating the last mentioned procedure is to avoid having to make an unnecessarily large and consequently deforming meatus in order to get a proper view of the region of the tube. By carrying out the above procedure, the meatus in the vast majority of cases can be kept within cosmetic limits and need not be noticeably enlarged.

We occasionally meet with a bone in which the convexity of the anterior canal wall is so marked that we cannot lessen this to the required degree without endangering the joint cavity. Inasmuch as a proper view of the region of the tube must be had, we then must make an opening in the concha sufficient for that purpose, regardless of the appearance.

The region of the tube is essentially a region of trouble, but to the tube itself failures are often attributed for which it is not responsible.

One of the most important of these is the failure to remove the extreme anterior portion of the annulus tympanicus. When this structure is prominent, as we look forward at the tube from the mastoid excavation, the annulus presents the appearance of a rim or flange of hard white bone which juts out into the lumen of the cavity, which partially conceals the mouth of the tube, and under the ledge of which granulations are easily overlooked. These granulations having been thoroughly removed, the rim of the annulus, the lip overhanging the tube orifice, should be removed so that the anterior portion of the tympanic cavity will resemble in shape the small end of an almond with its sides converging and with the smooth and round end of the tube at its apex. A very small, round curette or a burr may be used to remove this portion of the annulus.

One great disadvantage of allowing the annulus to remain is witnessed during the period of healing. As the process of epidermization advances toward the region of the tube, upon reaching the rim of the annulus, the course of epithelial growth is suddenly diverted and directed out into the lumen of the cavity, the flange of the annulus acting as a jetty, onto which the epithelium runs. As cell proliferation continues

the summit of this jetty by the piling up of its epithelium, is gradually made to extend across the cavity to the anterior portion of the internal tympanic wall. The extreme anterior portion of the tympanum and the mouth of the tube are then shut off from the main cavity by this epithelial curtain, anterior to which granulations form. In some instances the curtain is incomplete and sickle-shaped. In looking into such a cavity we are frequently struck by what appears to be a perfect result. Upon careful examination, however, it will be seen that from the extreme anterior end of the cavity a crust may be removed, beneath which there may appear either a point of pus or a granulation, presumably at the mouth of the tube. This apparent mouth of the tube is, however, nothing more than a hole in the "curtain" to allow of the escape of fluid contents pocketed anterior to it. When the curtain is broken down the true condition is revealed, but inasmuch as the annulus remains, the curtain is liable to reform, and once we have failed to remove the annulus at the time of operation it practically becomes impossible to do so later; depending upon the prominence of this structure, which varies with the individual bone, is the likelihood of trouble. This complication can be prevented by either primary or secondary grafting or by firm packing, and is most commonly seen in cases which are not grafted and in which little or no packing has been used.

The accessible portion of the tensor tympani muscle and cochleariformis, the semi-canal or curled lip of bone supporting the tensor tympani muscle, should be destroyed; otherwise the tube, considered from a surgical standpoint, is divided into an incomplete upper and lower compartment, and though the tube proper (the lower) is thoroughly curetted and cleaned, granulations persist in the upper portion and keep up a protracted suppuration. Another source of considerable and frequent annoyance is the failure to remove the diseased cells often found in the vicinity of the tympanic orifice of the tube and for which the tube is generally held responsible.

Before making the flaps, in order to insure as clean a cavity as possible, irrigation with normal salt solution, followed by ninety-five per cent. alcohol, should be practiced, and particular care should be exercised in wiping out the cartilaginous canal. A temporary pledget of gauze should be placed in the tympanic cavity and the mouth of the tube packed off.

One of the most important features of the operation is the

making of a proper meatus and flaps. The failure to succeed in this is a fatal error to a good result, and the mistake when made, most commonly consists in not securing a sufficiently large opening through which to dress the cavity. It may be stated without reserve that the natural meatus must be enlarged, and if we fail to do this we may expect uniformly poor results after prolonged treatment. Nor is a normal sized meatus desired, even though we could secure this and at the same time get a good temporary healing of the cavity. These meati often show a tendency to contract, and we have not finished with a radical operation upon the epidermization of the cavity. When we ignore the possibility of future complications and fail to provide a proper opening through which to see and treat the cavity, should these occur, we have failed to either appreciate the significance or the scope of the surgical problem with which we are confronted.

In the vast majority of cases, it is unnecessary to noticeably enlarge the meatus, *i. e.*, to enlarge it to the point of cosmetic defect. When the meatus is made shapely and in accordance with the natural outlines of the orifice, a much larger opening can be made without its attracting attention than when the opening is irregular and unshapely.

After a trial of the various flaps which have been advocated I am of the opinion that an essential feature to a good flap is, that it be made so as to allow at least a small portion of it to be turned down, sufficient, that is, to give the lower flap the proper direction for growth and to prevent its curling upon itself, and to some extent to cover the inferior pillar (the facial ridge).

The flap from which I have obtained the best uniform results is made as follows: The point of the knife is placed at the junction of the lower and middle thirds of the cartilaginous meatus, in its posterior half, and from before backwards is made to pierce of the auricle. The incision is then carried horizontally outward into the concha for a distance sufficient to insure a good opening. It is then curved upward, and as it continues, a trifle forward, and terminates on a level with and immediately behind the postero-superior margin of the cartilaginous meatus. The posterior wall of the cartilagino-membranous funnel is then slit inward to its apex, and so divided as to give the upper two-thirds of its length to the upper flap, the lower third to the lower flap. As the above incision is carried out into the concha and as it curves

forward, the knife is so held as to allow the entire incision to be bevelled at the expense of the posterior surface of the concha.

So far as I know, this is a point which has not been embraced in any flap yet advocated. The advantage to be derived from bevelling the posterior surface of the artificial meatus is, that as we dress the wound and insert into the meatus the cylinder of gauze to hold it open, the plug carries before it and infolds the bevelled edge, and epidermization proceeds rapidly, for the infolded skin margin is at once given the proper direction in which to grow. This infolded edge, moreover, protects a rim of otherwise bare and exposed catilage, and those of us who have ever had the misfortune to have develop here a perichondritis will adopt any means to avoid a second. It decidedly lessens the likelihood of such a complication; it prevents the formation of those granulations which generally sprout just within the posterior margin of the artificial meatus and which cause so much delay in the process of epidermization by blocking the attempt of the conchal epithelium to override the cartilaginous rim of the orifice.

The upper flap is next freed of all redundant tissue, the included cartilage is dissected out, and this portion of the flap is now represented by a skin membrane which, as the ear is later drawn back in position and the wound sutured, slides in over the dome of the excavation. Only one catgut suture should be taken to hold this flap in position, and it should pass through the extreme anterior and external edge of the flap; it should be anchored to the upper portion of the anterior lip of the curvilinear wound at a point corresponding to the superior rim of the bone cavity. The temporal muscle as it lies in its undisturbed position offers an inviting point at which to anchor the flap, but it should not be used for this purpose. For some reason it seems particularly prone to become infected under these conditions. The requirement to be met is so to anchor the flap as to prevent its prolapse into the meatus and to hold its outer end up to the vault of the bony cavity, the inner end being held in contact with the dome by the gauze packing introduced through the meatus. When more than one suture is taken, the second suture which is placed at a point in the flap internal to the first, when tied, pulls the flap away from the vault of the cavity and crumples it upon itself. It accomplishes no good purpose, introduces more catgut into the

wound and adds to the probability of infection, and prevents the flap from reaching as far inward over the dome of the cavity as it should; it consequently delays epidermization.

The lower flap representing the inferior third of the membranous canal and meatus, and the inferior third of that portion of the concha used for the purpose of flap formation, is next turned down and held in position by a mattress suture, which is anchored to the anterior lip of the curvilinear wound below. Before this flap is anchored, the cartilage is dissected out as in the upper flap, and before the conchal portion of this flap is turned down the original curvilinear incision in the concha is carried down to the level of the floor of the cartilaginous meatus. The outer end of the lower flap is then represented by a tongue of skin, and as the mattress suture is drawn tight, the inferior flap is held down in contact with the floor of the bone cavity and in proper direction for epidermization to proceed.

The advantage of a slight inferior flap is that it covers a portion of the cavity which is notoriously tardy in becoming epidermized, and certainly the time of healing is shorter than when the entire posterior membranous canal is utilized for an upper flap. When the latter is done a small skin graft should be applied to the inferior pillar (the facial ridge) at the time of operation. If the graft takes, it serves the purpose of the inferior flap, but primary grafts are notoriously uncertain; we are grafting upon a septic base, and when they cover large areas of the cavity, particularly areas which are in proximity to the dura, or if the dura itself is exposed, are not altogether free from danger.

The curvilinear incision should be sutured with silkworm gut; four sutures are generally sufficient, and while these are being introduced, the points of puncture should be supported so as to prevent traction upon the flaps as the needle is passed through the tissues.

The temporary packing is now removed, the cavity wiped dry and packed through the meatus with small squares of gauze. On the third day the cavity is dressed and the sutures removed. As soon as a good firm bed of clean healthy granulations arises, a secondary skin grafting is done through the meatus. It is unnecessary to anesthetize the patient for this purpose; by holding a block of ice upon the thigh for several

minutes, there is little pain, and the vitality of the graft is not impaired.

In an ear which possesses a useful amount of hearing, I do not place grafts immediately over the round and oval window, but graft as close to these as possible without covering them. At the same time the tendency to the formation of granulations is kept down so that the least possible barrier to the sound waves is interposed. The attempt in these cases should be made to get epidermization in this region as quickly as possible with the least amount of tissue blanketing the windows. In order to carry out these manipulations satisfactorily, it is essential that the facial ridge be lowered to its absolute limit, and the pyramid, if prominent, destroyed.

We occasionally get brillant results by grafting, but often the healing of the cavity is not materially shortened. I think a fair estimate of the value of grafting is, that we may generally expect to shorten the period of healing by several weeks.

An excellent result, whether grafting is or is not practiced, is complete epidermization at the beginning of the fifth week. In cases of encapsulated cholesteatoma the post-auricular wound should be left permanently open; if sutured, we will probably have to reoperate at a later period. All adenoid vegetation should have been removed from the nasopharynx, as it constitutes a menace to the ear cavity.

I do not believe in primary skin grafting as it stands today, and as I have seen it practiced. It is not in accordance with surgical principles. By our operation we have removed the protective barrier of granulations; we have exposed a large area of raw, absorbing surface; we have opened innumerable small vessels, and their mouths stand ready to receive infection; the field is septic, and with our skin grafts we blanket this infected bed, which stands not only in dangerous proximity to, but indirect vessel connection with the endocranial lymph sac. On two occasions I have seen meningitis and death follow primary skin grafting, and in these cases it would have been very difficult to have attributed these deaths to any other cause. I have been unable to get results which would lead me to adopt it as a routine practice, nor have I seen such results obtained by others. In a procedure so simple in its technique it seems strange that operators should so vary in the results reported.

Of 22 consecutive chronic cases, in none of which was the duration of the disease under three years, operated upon ac-

cording to the above technique, complete and apparently permanent epidermization has followed 21 times. One patient disappeared from the hospital about the sixth day after the operation, remained without treatment and with a dressing in the ear for two weeks. He returned at the end of this time with an abscess of the auricle, a perichondritis, the meatus completely closed, and the cavity a pool of pus and foul granulations. In this instance curetting of the cavity and a plastic operation was necessary later.

VII.

REPORT OF A CASE OF BRAIN ABSCESS, RESULTING FROM CHRONIC PURULENT OTITIS MEDIA.*

By James F. McKernon, M. D.

NEW YORK.

The following case is reported, not because there were any new or unusual diagnostic symptoms presenting, but because the writer believes that every case of brain abscess, whether successful or fatal, should be reported, so that our records in the future, and the statistics taken from them, may be more nearly accurate, and thus enable us to correctly determine the percentage of cases of cerebral suppuration caused by disease of the middle ear.

The history in this case, which terminated fatally, is briefly as follows:

M. G., a girl eleven years of age, was first seen on December 16, 1904. Her mother said that the child had had a running ear on the right side for the past eight years, in consequence of an attack of measles when she was three years old. The mother remembered that twice during the eight years the ear had stopped discharging. Once, when the child was six years old, the discharge had ceased for several months; and again, three years later, there was no discharge for six weeks. With these two exceptions, there had been a continuous discharge of pus from the ear for eight years.

About a year before, she had spoken to her family physician about it and asked him what she should do for it. He told her to let it alone, as it would be very had to check the discharge; and that when the diseased material had all come away, the ear would get well of itself.

For the past month the mother had noticed that the child was very dull, and often extremely irritable with the other children. At night she was very restless, would grit her teeth,

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and occasionally give a short, sharp cry as if in pain. If awakened at this time and questioned, she would say she had pain all over her head. Four days before I saw her, she vomited, said the daylight hurt her eyes, would not eat and continually complained of headache. During the past three days she had been lying in a stupor, moaning and groaning and tossing from one side of the bed to the other. When aroused, she would attempt to answer a question, but before she could do so, would lapse again into unconsciousness. She refused all food. The family shysician had been called in to see her several times during the last few days, and had told her mother that the child must be kept quiet. He had given her a hypodermic of morphin at each call.

Physicial examination showed a child apparently about eight years old, very much emaciated, moaning and moving from side to side of the bed. Her color was indicative of sepsis, the tongue was dry, glazed and heavily coated, the eyes were closed tight and her hands were clenched. The temperature by rectum was 97.3 F., the pulse was 52 and the respiration 14 per minute. Examination of the right ear disclosed a large polypoid mass completely filling the external auditory canal and meatus. This was covered with a thin but very foul-smelling discharge.

The mastoid was normal in appearance, the left ear was negative. A diagnosis of brain abscess was made, and the mother was told of the critical condition of the child. She said if there was a possible chance of saving the child's life by an operation, she wished it done. She was then told that at that late day, even with an operation, the child would in all probability die in a few hours. Notwithstanding this, she requested that an operation be performed as speedily as possible.

A hasty preparation was made, and within an hour the child was on the operating table. While preparing for the operation, one of the assistants examined the eyes, and reported double choked discs.

Operation: Chloroform in small quantity was administered. Feeling certain that we had a cerebral abscess present, I decided to expose the brain primarily, and chose as the point for entering the skull a space near the floor of the middle fossa, corresponding to a point directly above the mastoid antrum, as I believe, in children, cerebral infection occurs more frequently by an extension from the mastoid antrum through its roof than by way of the tegmen or other portions of the bone.

The dura was exposed rapidly to about the size of a silver half dollar, the lower margin of the opening being as low down as the floor of the middle fossa. The exposed dura was not at all dark in color, but rather white or grayish, and devoid of lustre, and did not show any undue prominence by bulging into the opening made by the removal of the bone. It was incised freely with a scalpel, and sutures introduced to act as retractors. Upon exposing the cerebral substance, it was found to be lustreless also, and did not bulge prominently into the openings through the dural flaps. A knife with a long slender blade was introduced just above the bony floor, and directed upward for about one inch. Before the blade could be withdrawn, pus gushed through the opening with such force that it was carried as far as the elbow of the operator, as though propelled by a pump. The opening to the cerebral cavity was enlarged by the introduction of the finger, and it was estimated that between three and four ounces of pus had been contained in the cavity. Certainly it was the largest amount of pus I have ever seen coming from the cranial cavity. The abscess wall was composed of a limiting membrane and the cavity was cleansed by wiping it out with narrow strips of gauze.

Upon inquiring of the anesthetist the patient's condition, I was told that the pulse had gradually increased in rapidity to 90 per minute, was of good force, and the respirations higher than before.

Owing to the improvement in the patient's condition, it was decided to open the mastoid. This was quickly done, and it was found to be necrotic throughout, and completely filled with a cholesteatomatous mass which was removed.

Into the brain cavity was inserted a wick of sterile gauze moistened and rolled in equal parts of boric acid and iodoform powder. The wound was dressed as rapidly as possible and the patient placed in bed. The time consumed in the operation and dressing did not exceed twenty-five minutes. A saline solution was thrown into the bowel to forstall any sudden collapse.

The patient did well, the pulse increased to 120 per minute, the respirations were only slightly above normal and the temperature rose to 102 F. She became conscious, asked for a drink, and said her head pained her, but not as badly as it did in the morning. In about an hour she became worse, the temperature arose to 106 F., pulse 180 and respiration loud and snoring in character; and within another hour she was dead, having survived the operation about eight hours.

The pus was examined bacteriologically, and found to contain a mixed infection. It had an extremely foul odor as is usual in abscess cases of long duration.

The history of this and similar cases teaches us how extremely dangerous it is to allow a chronic suppuration of the middle ear to continue unchecked. But while we, as otologists, recognize the danger, does the average general practitioner of medicine to-day so recognize it? While some may, I do not believe the vast majority do. If they do not, is there anything that we, who are practicing this especial branch of medicine, can do in the future to enlighten them?

I think we can, and the first step in the right direction is to teach the medical student of to-day, who will be the general practitioner of tomorrow, how to recognize and properly treat acute affections of the middle ear, for if so treated an acute inflammatory process need rarely become chronic. If it should become so, we should insist upon his knowing the danger that may arise from a continuance of this condition, and the appropriate surgical treatment for its relief.

62 West 52d Street.

VIII.

A CASE OF SARCOMA OF THE MAXILLARY SINUS.*

By Z. L. Leonard, M. D.,

NEW YORK.

The case here epitomized presents some features which may be deemed worthy of consideration at this time.

C. H. T., 51 years of age, a merchant, born in New England, of exceptional healthy and long lived ancestry, applied for relief Sept. 15th, 1903. He had recently returned from a month's trip through the West including the Yellowstone Park. It was after a long stage ride in the Park, where he suffered much from the irritation caused by the clouds of alkaline dust, that he had his first attack of epistaxis. During the journey home he was frequently annoyed, more at night, however, than in the daytime, by the bleeding. There was no pain accompanying this bleeding nor was it so excessive that he was forced to consult a surgeon, simple measures staunching it. The hemorrhage was entirely from the right nostril trickling also into the pharynx.

Upon examination, the right inferior turbinate was considerably enlarged but not sensitive to touch by the probe, nor was any painful spot discovered either internally or externally. No bleeding point could be found. The posterior rhinoscopic image was normal. An astringent solution was thrown into the nostril and the patient was ordered to use frequently a spray containing sulphate of zinc. This sufficed until the first of October, two weeks, when he reported again saying that the bleeding had recommenced.

The inferior turbinate had increased in size during the time and was more sensitive but not painful on pressure. Four daily treatments again checked the flow of blood and patient did not call again until the 28th of October, or for more than

*Read before the Eastern Section of the American Laryngological, Rhinological and Otological Society, Philadelphia, February 4th, 1905.

three weeks. At this time the turbinate had increased to such a size that it nearly touched the septum. It had a firm healthy appearance and did not bleed. For the first time the patient spoke of a pain on the right side of the face which he thought was caused by a decayed bicuspid tooth. Antral disease was suspected but these were the first symptoms which could be elicited from the patient which might be a ground for such a suspicion. He had already consulted a dentist who began the treatment of the tooth with the hope of saving it. The epistaxis came on at regular intervals, usually at night. The patient continued under the care of the dentist through the month of November but with no permanent relief.

Early in December he presented himself again with well marked tenderness of the cheek, but no bulging, neuralgic pains and conjunctivitis. The turbinate had now attached itself to the septum by a web-like membrane through which there were two openings barely admitting a probe. Except for the inability to breathe freely through the nostril he suffered no great inconvenience, but could clean away the mucus with spray and handkerchief. Transillumination gave an umbra extending over the whole maxillary sinus. He was advised to have the bicuspid, which was very tender on pressure, removed at once. This was done, with slight relief, and the dentist referred him back to me, saying there was no drainage and he had done all he could.

On December 17th the patient was etherized preparatory to the removal of the inferior turbinate and for the purpose of making a free opening into the maxillary sinus. The turbinate was extracted with forceps. Passing the finger into the nostril beyond the base of the turbinate it entered the sinus through a wide space in the bony wall and came in contact with a mass, soft and friable. With the finger and curette this mass was removed as thoroughly as possible. The orbital wall had been so destroyed that the eyeball could be readily felt. Its surface was intact, apparently normal. It was then deemed advisable to make a counter-opening through the canine fossa to secure complete drainage. The lip was retracted and the usual incision made. Cutting through the soft tissues the knife immediately penetrated the sinus through another large opening in the bony wall in this locality. Again introducing the finger through this aperture it was discovered that almost the entire wall of the sinus was eroded or missing. As the request had been made that there should be

no external mutilation, further operative interference ceased at this point. The bleeding, which had not been excessive, abated when the parts were washed with hot water. The sinus was firmly packed with iodoform gauze. The patient reacted well, no untoward symptoms arising. A bit of the gauze was withdrawn daily until all had been removed, when a rubber drainage tube was inserted. Through this the sinus was irrigated with a warm saline solution for six weeks. A portion of the mass taken from the sinus was submitted for pathologic examination educing the report that it was a round cell sarcoma, quite vascular and with small hemorrhages in different parts of the growth.

The patient complained no more of pain in the cheek after the operation until March. He ate and slept well, attending to his business every day, going first on New Year's day. The right eye became more involved, with painless loss of the sight, its appearance causing the most annoyance. About the beginning of March there was evidence that the sinus was rapidly filling up again. There was bulging of the whole right side of the face, the eyeball protruding from the orbital space. The floor of the sinus and the alveolar processes were destroyed, allowing the teeth to fall out. Large sloughs extending into the mouth had to be cut away frequently. There was no extension of the growth below the superior maxilla. The function of deglutition was never interferred with materially. Patient died on April 14th, 1904, and no autopsy was allowed.

The antecedent history of this patient was as follows: On March 15th, 1902, a small non-malignant tumor was excised from the vicinity of the left mamma. On the site of this surgery a second growth appeared which was removed on January 26th, 1903. This operation was a thorough one, not alone the growth itself, but also the axillary glands were ablated. This second growth was examined and found to be sarcomatous. On March 15th, 1902, at the first operation, there was no glandular enlargement. Almost immediately after the second operation the patient began to have treatment by the X-ray and injections of the Coley toxin, one day receiving one the next day the other. The toxin was increased to twenty minims to a dose, producing well marked systemic disturbance. This treatment was kept up faithfully until August and resumed in September. Both were continued until

December 17th. From that time on the X-ray was abandoned but the toxin was used until shortly before death.

The details of interest worthy of consideration in connection with this case are: The inexorable advance of the disease notwithstanding the adoption of surgical and therapeutical methods approved and modern to check its progress; the absence of excruciating pain or copious hemorrhage and, most remarkable of all, was the lack of any cerebral symptoms even to the very last. This is especially to be noted since movement was apparently in the direction of the important region lying at the base of the brain. The writer is indebted to Dr. D. M. Marvin, the family physician, for many valuable facts in relation to this case.

19 W. 120th Street.

IX.

CARIES OF BOTH PETROUS PYRAMIDS—REMOVAL OF THE ENTIRE PETROUS PORTION OF THE CRANIAL BASE AFTER DOUBLE PETROMASTOID OPENING, PERMITTING TRANSMASTOID ENDOCRANIAL COMMUNICATION—OPERATIVE CURE—DEATH FROM TUBERCULOSIS OF THE LUNGS—REMARKS UPON THE TECHNIQUE OF OF PETROUS ABLATION.*

By Dr. Pierre Cauzard,

PARIS.

The case which I am about to report appears interesting:

1. In the absence of meningenal or cerebral symptoms.
2. In the extent of the lesions.
3. In the importance of the osseous resection and ablation, that is to say, the removal of one of the most important parts of the cranial floor, permitting thus the traversing of the endocranium, from left to right or right to left, by means of a long probe.
4. Complete preservation of the right facial; partial preservation of the left.
5. Operative cure, without meningeal, cerebral or bulbar symptoms.

A young man, 18 years old, was sent to me with suppuration of both ears, in May, 1903. The patient was of feeble constitution, that of a child of 12 or 13. In infancy he had had measles and scarlatina; his ears had suppurated since the age of 7 or 8. At the age of 15 he had been operated upon for adenoids. After the operation the purulent discharge had been more abundant and the patient had increasing difficulty

*Read before the International Congress of Otology, Bordeaux, 1904.

in opening the mouth. For over a year he had been unable to masticate and subsisted upon liquid and semi-liquid food.

Family history: Father died of tuberculosis; mother in good health.

First examination, May 30, 1903. Abundant purulent discharge from both external auditory canals and the nasal fossae. With the probe a sequestrum was felt in each canal beyond the limits of the internal wall of the tympanum. The patient could hardly separate his jaws; however hypertrophied tonsils and abundant pus descending from the pharynx were seen. Teeth carious. Stomatitis.

Diagnosis: Caries of both petrous.

Treatment: Free lavage. Operation upon both sides was proposed.

The patient returned April 2, 1904. Same condition as before. In December, 1903, the patient had vertigo for three days, then ceasing entirely. Frequent nuchal headache; no facial paralysis; trismus augmented; gingivitis, stomatitis; flow of pus from the pharynx, nares and ears; upon lavage of the ears water escaped through the nose and throat. Two weeks previously the patient had expectorated something which, from the description given, we thought might have been a small sequestrum from one of the petrous. By exploration of both tympani with the probe, sequestra were felt; on the left the probe extended to a depth of over 6 cm. from the tragus; the patient did not complain of vertigo or tinnitus. Deafness was not absolute, but increased. The patient heard loud voice at 2 or 3 cm.; the fork on the mastoid was heard on the right. General condition bad; the patient was emaciated, there was infiltration of the right apex, and thoracic expansion was small. Urine contained neither albumin nor sugar. Operation was again proposed and was accepted.

Operation upon the left side, May 21, 1904. Thinking that the antrum could not be uninvolved, although there were no signs of antritis, I began by making a petro-mastoid opening (classic operation).

1. The petro-mastoid opening: Retroauricular incision in the shape of a T; abundant vascularization; antrotomy; antrum filled with granulations. With the forceps I broke away nearly all the mastoid down to the internal wall, laying bare the lateral sinus, which was healthy. The aditus was opened freely; the tympanum was hardly recognizable, having

become a vast cavity filled with granualtions and sequestra. which were removed with the curette. The tegmen was destroyed; the labyrinth and the petrous were represented by a deep seated sequestrum.

2. Resection of the squamous. The lesions extending into the temporal fossa, I prolonged the cutaneous incision upward and rugined a large portion of the squamous, which I freely resected, laying bare the dura mater covered with granulations which were curetted away. Because of the diseased bone, and in order to reach the diseased pyramid, I resected the entire antero-superior long wall of the auditory canal, the root of the zygomatic process and the tympanal portion of the auditory canal, thus removing the postero-superior wall of the articular cavity, which received the condyle of the inferior maxilla. The auditory canal in the temporal was thus completely destroyed, the wall over the facial nerve curetted and gouged away, and the facial uncovered. Turning aside the temporal lobe there was revealed a regular well almost filled with a large sequestrum and surrounded by pus and bleeding granulations.

3. Morcellation and extraction of the petrous sequestrum. A probe penetrated deeply along the sequestrum, going beyond the median plane, gliding in front of the bulb and entering the opposite cranial hemisphere. I finally morcellated and freed the sequestrum, which represented the whole of the necrosed pyramid. This part of the operation was most laborious, but, by the morcellation, I was able to extract all the sequestrum, but without being able to avoid wounding the facial, as was shown by a few muscular contractions of the face. The extraction finished, there remained a pyramidal cavity over 7 cm. deep, having the general outline of the petrous, the apex corresponding to the apex of the other pyramid, the base represented by the external opening made at the expense of the canal, the tympanum and mastoid. The superior wall of the cavity was formed by the dura mater covering the temporal lobe; the posterior wall was made by the cerebellar dura mater and the corresponding lobe of the cerebellum, more deeply by the medulla; the anterior wall was the posterior portion of the temporo-maxillary joint capsule, a part of the temporal and the great wing of the sphenoid, and more deeply by the basilar groove and its suture with the body of the sphenoid.

Warm lavage was attempted, but the patient was attacked

with cardiac and respiratory syncope, arrest of the pulse, heat and respiration; the corneae became dull and the skin livid.

Artificial respiration was done, together with rhythmic traction upon the tongue, the precordia was cauterized, and two injections of ether were given. After 7 or 8 minutes the pulse reappeared, although very irregular, and respiration was re-established. The syncope appears to me to have been of bulbar origin, provoked by contact of the lavage with the bulbar region, as the introduction of a small quantity of solution into the larynx and trachea would hardly account for it.

The wound being cleared out it presented itself as a large hole, wide without, directed inward and slightly forward, narrowing and dividing into two cavities forming a Y. The anterior cavity, very short, opened into the cavum, permitting a view of the left aspect of the vomer, and the left choana. It passed in front of the basilar process and the sphenoid, behind which was the other cavity, extending deeply as far as the petrous of the other side, beyond the anterior aspect of the bulb. Hemostasis was easily obtained after resection of the entire membranous canal. I tamponed with iodoform gauze and dressed with sterile cotton. The operation lasted nearly an hour and a half. The other side was dressed. I took note that the lavage water thrown into the left side escaped through the right canal.

Subsequent course almost normal. The patient regained complete consciousness. There was complete left facial paralysis. The following treatment was instituted: (1) Three full lavages of the right ear with a 10 to 1000 solution of sulphate of soda and chlorid of sodium; (2) a subcutaneous injection of 500 c. c. of saline; (3) lavage of the bowels with a litre of saline.

First week: Disappearance of the headache; persistence of the facial paralysis; evening rise of temperature not above 37 C. Congestion at the base of both lungs, with intercostal pain. Revulsives and tonics given. On the second and fourth days after operation the patient expectorated two small sequestra.

First dressing, May 28: Wound of normal apearance, no suppuration. It was easily cleaned with tampons of dry cotton and mopping the cavity with peroxid. When the right ear was irrigated the fluid came out the right naris, but the stream could be easily seen in the bottom of the wound.

Second week: Injections of cacodylate of soda; intestinal

lavage; feeding easier and more abundant. Locally, three large irrigations of the right ear were given, which continued to suppurate freely. The mental state was excellent; the intelligence was alert; there were no bulbar symptoms, no oculo-motor paralysis. The pulse was between 90 and 100; temperature between 37 and 38 C. In the course of the week showed considerable intermittence.

Second dressing, June 4: After dressing, the temperature become normal, in the neighborhood of 37 C.; pulse about 90, regular. Auscultation, however, revealed progressive tuberculous lesions.

Third dressing, June 11: Epidermization was rapid. At the bottom of the wound was mucus, apparently coming from the cavum. The patient got up. He had no difficulty in standing, no headache, no vomiting. Mastication became more and more easy, the trismus being less severe.

Fourth dressing, June 18: Epidermization had reached the bottom of the wound and cure was progressing. The temperature ranged between 37 and 38, but seeming good, we decided to attack the other focus of suppuration.

Second operation—Right side (June 29. 1904):

1. Petro-mastoid opening. Retroauricular incision in the form of a T. Stripping off the periosteum I found a spontaneous perforation over the antrum, the size of a 50 centime piece. There was no other sign of antritis. Mastoid filled with cholesteatomatous matter which was cleaned out and freely curetted. Behind was the lateral sinus, separated from the integument by an extremely thin shell (1 millimeter), a rarity to which I call attention. The bony septum of the aditus was destroyed.

2. Temporal resection. Resection of the superior border of the canal, of the longitudinal root of the zygomatic process and the tympanal portion of the temporal, and a small portion of the squamous. Destruction of the tegmen tympani

3. Morcellation of the petrous. The bed of the facial nerve and the labyrinth were destroyed with the chisel and curette. The sequestra were carefully removed after they had been, with difficulty, detached from the facial nerve, which transversed the operative field from above downward, from behind forward, and from within outward, that is to say, from its origin to the stylomastoid foramen, its intrapetrous path no longer existing. With a Kocher forceps I removed the osseous debris, which represented the remnants of the petrous apex,

without injuring the carotid artery. I was then stopped by a fibrous partition separating the operation wound on the right side from that of the left. This partition was formed of periosteum and dura mater, one portion extending from the right outer border of the basilar process to the posterior part of the internal border of the great sphenoid wing, thus separating the cranial cavity from the right choana; the other portion stretched backward toward the bulbar dura mater. It had two openings; one. the anterior, permitted the introduction of a probe into the right choana as far as the vomer; the other, posterior, allowed the passage of a long probe from the operation wound on the right side through to that of the left side, thus passing between the basilar groove and the anterior aspect of the bulb. I was able, then, to traverse with a probe the lower portion of the cranial cavity, entering the right mastoid antrum and coming out through that of the opposite side. This I call transmastoid endocranial transfixation. The operation was finished; the cavity was packed with iodoform gauze; the opposite side, which was healing rapidly, was dressed.

First week, June 27 to July 2: General condition satisfactory. The temperature did not go above 38. The patient fed himself much more easily, as he could masticate better than for nearly two years. Trismus much diminished. The pain caused by the motion at the temporo-maxillary articulation no longer existing, he spoke with greater ease. No right facial paralysis; on the left side he was now able to close the eye, and the facial distortion was less pronounced. The left facial had not, therefore, been destroyed, but wounded.

First dressing, July 2: On the right the wound looked well in the temporal portion; suppuration in the lower part, the cervical region. On the left, superficial cauterization was complete; the skin had covered over the dura mater and the inferior surface of the temporal lobe. In masticatory movements the maxillary condyles on both sides could be seen rotating in the joint capsule, which was in direct relation with the wound. I was still able to traverse the cranial base with a probe from mastoid to mastoid.

Second week, July 2 to 9: The temperature was very irregular, but not exceeding 38.4. Pulse about 90. Patient dyspneic. However, he was able to stand up a little without vertigo, headache or trouble in standing. July 9, on examining the chest, a large cavity was found in the apex of the right

lung, the evolution of which had been rapid. Over the extent of both lungs there was fine subcrepitant rales. The patient did not cough or expectorate. Profuse sweats.

Dressing: On the left cicatrization well advanced. On the right the wound was suppurating; superficial epidermization. Packing with iodoform gauze.

July 9 to 14 the temperature varied between 37 and 39. General condition became very bad. Increased dyspnea. Auscultation of the lungs showed complete tuberculosis invasion.

Dressing: On the left continued improvement, which was astonishing, in view of the general condition; right stationary. Iodiform gauze.

The patient died July 17, with consciousness unimpaired, and without bulbar, meningeal or cerebral symptoms. It appeared as if the second anesthesia, with chloroform, like the first, accelerated the pulmonary tuberculosis. The question also arises whether or not two operations upon tuberculous lesions might have provoked the rapid spread in the lungs.

Remarks.

From the history of the case we may deduce:

(1) The possibility of surviving the double operation, ablation of both petrous processes; that is to say, ablation of an entire part of the cranial floor, death having been due to the pulmonary lesions.

2. It seems that to perform total ablation of the petrous processes it is better to go through the temporal region—the squamous. It is easy thus to lay back the temporal lobe after detaching the dura mater from the squamous. After my experience with these two ablations I propose to operate thus:

Operative Technique.

(1) Classical petro-mastoid opening.

(2) Detachment of the periosteum from the squamous.

(3) Resection from the squamous of a semicircle with a radius of 2 or 2½ cm., the center corresponding to the auditory canal. This circle should have its base situated upon a horizontal plane passing through the inferior border of the bony canal, thus including resection of all the longitudinal root of the zygomatic process.

(4) Resection of all the tympanal portion of the bony canal, that is to say, the antero-inferior wall of the canal. For all these resections employ only forceps, and not the chisel and hammer.

(5) Turn back the temporal lobe covered with dura mater.

(6) Dissect out the facial, a delicate operation, but facilitated by the previous resection and the lessened resistence of necrotic bone.

(7) Morcellation of the sequestrum, avoiding the carotid, the position of which should always be previously determined. Take a temporal bone, look at the carotid canal; it is very thin, and in necrosis of the petrous it is one of the first parts to be destroyed. The carotid is then surrounded by dura mater, and the internal border of the great wing of the sphenoid. (In my two operations I did not have to concern myself with this).

In breaking up the sequestrum beware of mislicks backward, for the instrument is not far from the basilar groove, that is to say, the bulb.

With prudence, sponging deeply and frequently, so as to give a clear view, and using the hand mirror, the operation is easily managed.

I wish to caution against lavage or the introduction of fluids in any form.

The dressing should be a firm packing of antiseptic gauze, preferably iodoform.

As the operation wound communicates with the pharynx and nasal fossae simple sterile gauze would soon become infectious. The packing should be done carefully and firmly, so as to make a barrier between the pharynx and the dura mater protecting the bulb and encephalon.

X.

ON THE RELATIVE FREQUENCY OF THE DENTAL AND NASAL ORIGIN OF ANTRAL EMPYEMATA*.

By George L. Richards, M. D.,

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The question of the origin of antral empyemata is one that has occasioned considerable discussion. Originally the dental profession had the entire field, but of late the nose and throat specialist is probably seeing relatively more cases as an individual than is the individual dentist, and whereas originally we thought most of them to be of dental origin, at the present time I think the consensus of opinion would rather be that the majority of them would prove of nasal rather than of dental origin, although when one comes to search the literature in regard to it, one meets with the most various opinions, varying somewhat with what has been the author's individual experience. Without wearying you with citations from a large number of authors which would have no especial value, I nevertheless wish to make a few quotations from the recent literature on the subject from three authors, and then wish to give you my own personal observations in regard to the subject.

In the *Monatsschrift für Ohrenheilkunde* of June, 1904, Dr. Alexander Strubell, of Dresden, has a very exhaustive article on the relationship of the vessels of the antrum to those of the teeth. Finding that there was the greatest variation in the opinions expressed by so-called authorities; finding also that there are apparently cases of dental origin of antral empyemata in which there is no communication with the antrum to

*Portion of address delivered before the Harvard Odontological Society December 15, 1904, on the "Relation of the Dentist to the Ear, Nose and Throat Specialist," and extracted from the International Dental Journal.

be seen, and yet in which the clinical history would seem to admit of no doubt that such cases of empyemata had originated from the teeth, he set out to see if he could not anatomically find some relationship between the vessels of the teeth and those of th antrum, or at last some condition that is not as yet fully understood, by which the pathogenic focus could be carried to the antrum mucous membrane. There being no especial lymph-tract, only the blood-current was left, and the question then was whether there were any existing anastomoses between the blood-vessels of the alveolus and the mucous membrane of the antrum, sufficiently related together to render the theory of infection from one channel to the other plausible.

In most anatomic writings there is nothing concerning this, although Zuckerkandl, in his article in Scheff's "Handbook of Diseases of the Teeth," states that the vessels that supply the alveolus communicate with those of the external periosteum; that in the upper jaw there is in addition to the external periosteum an inner one, namely, the deep layer of the mucous membrane of the sinus, to which at the same time the arteries of the bone lead, and the veins from which lead to the bone. In a previous publication Zuckerkandl had briefly referred to something of the sort, but as Strubell could find nothing further in anatomic and clinical literature touching this point, he made personal studies on this matter in Professor Zuckerkandl's own laboratory. Tandler's method of injection with sodium iodin, gelatin and Berlin blue was used, and the posterior alveolar arteries were injected. The specimen was then fixed in formol, the lime salts removed in caustic potash and treated with alum, after the method of Schaffer. The sections were made from celloidin. As a result of the examination of the specimens, he found that there were three vessel systems—a long narrow one extending to the deeper layer of the mucous membrane of the antrum, that is, its periosteal layer; a coarse-meshed vessel system of the spongy bone of the upper jaw, and a fine-meshed one corresponding to the alveolus and the covering of the tooth-root; that individually these were very characteristic, but that with one another they had such a close connection that it was very difficult to absolutely differentiate them from the other. The junction of the vessels of the mucous membrane periosteum with that of the bone is brought about through numerous short, thick vessels coursing at short intervals in canals at right angles to the direction of the bone, while the obliquely cours-

ing arteries of the moderate size that bring about the communication between the blood system of the spongy bone with that of the alveolus are re-enforced by a large number of the finest blood-vessels. Here it is seen that the fine capillary system of the spongy bone, whose vessels lie in the marrow of the bone, are connected with those of the alveolus, and prove substantially the theory that the three systems are in foundation one and the same. Hence it seems proper to say that the nourishment of the antrum and its periosteum, the spongy portion of the upper jaw, and the teeth in the alveolus all come from one set of vessels which anastomose with one another in the most extensive way. It is easy therefore to see that inflammation may travel from the antrum to the teeth or from the teeth to the antrum, without there being a direct continuity of the surface or a direct infection from one diseased area to the other.

Strubell then goes on to discuss the question of the relative preponderance of origin between dental and nasal causes, giving the statistics which follow, all of which from European authorities I take from his article with the exception of those of Tilley and Lermoyez, the source of which is stated.

Bayer, of Brussels, thought the most frequent cause of empyema to be disease of the teeth.

Grünwald considered twenty-one out of thirty cases to be dental in origin.

Schiffers, Goodwillie, Moreau, Schmidt, Baginsky, Lublinski, M. Schmidt, Krieg, Schütz, Christopher Heath, Scheff, Heryng, and Schmiegelow, as the result of their clinical observations, consider the teeth to be an etiologic factor.

In an article read before the Odontological Society of London, November 23, 1903 (*Laryngoscope,* February, 1904), by Herbert Tilley, a prominent London laryngologist and surgeon to the Golden Square Hospital for the nose, throat and ear, the one founded by the late Sir Morell Mackenzie, Dr. Tilley reports briefly on sixty-four cases of antral suppuration seen in private practice, and eighteen hospital cases seen since January 1, 1902. Of the sixty-four cases seen in private practice, upon which his paper is based, he found diseased bicuspid or molar teeth to be present, or by their absence implying previous removal for disease, in every case, with one exception, upon the side corresponding to the antral suppuration. He says, further, that during the past ten years, during which he must have seen at least three hundred cases of

antral abscess, he has only met with one patient, a girl aged twelve, in whom the teeth were quite healthy.

B. Fränkel, as a result of his clinical experience, states that in by far the larger number of cases disease of the teeth and alveolæ was the causative factor. For his position he states that he had never seen a case of empyema of the antrum in which the corresponding tooth had not been previously extracted, or was at least diseased. This would agree with the observation of Herbert Tilley just quoted. And his final conclusion is that empyema of the antrum usually has its origin through the alveolus of the teeth.

Hartmann, in one article, stated that in sixteen empyemata only one case originated from a carious tooth. He reported one case of empyema of the antrum where, as the result of filling, or following the filling of a second upper molar, pus developed. The tooth was extracted. It was then easy with a few turns of the borer to go directly from the alveolus into the antrum, after which quite a quantity of pus was removed. Under daily washing healing followed a few weeks after. In another article Hartmann stated that in most cases carious teeth formed the etiologic moment for the antral empyema, but that it was not always possible to determine whether the inflammation of the tooth was the real cause of the inflammation of the antrum. In only two cases after extraction of the tooth did he find an opening directly into the antrum. The fact that, in spite of a previous inflammation of the roots of the tooth, healing of an empyema of the antrum has been brought about through washing out of the nasal cavity, allows us in many cases to say that there is probably no direct union of the antral cavity with the carious process. In one-third of Hartmann's cases there were polyps in the nose, and in these he thought there was a nasal origin of the affection. In twenty-three out of thirty-two cases healing was brought about through regular washing out through the middle fossa of the nose.

Lermoyez (*Journal Laryngology*, 1902, p. 576) states that dental origin is more frequent than nasal origin. This is due to the sudden rupture of the radiculo-dental periapexial abscess into the cavity of the sinus. It is only subsequently that the empyema is transformed into a chronic sinusitis.

Those authors who think that the inflammation comes from the teeth base their propositions on the fact that many tooth-roots, especially those of the first and second molar, reach al-

most to the periosteum of the antrum, and are separated from it by a very thin plate of bone, while in others even this thin plate is not present, and the roots lie in direct contact with the soft parts of the antrum. Caries of these teeth, therefore, leads easily to the periosteum, and not seldom to the formation of pus. Inflammation, therefore, can go directly to the mucous membrane of the antrum. Inasmuch, however, as almost all people have carious teeth, and as empyema of the antrum is comparatively seldom, this argument rather loses its force. It is perfectly possible that a carious condition can be present before the toothache appears. Even if after extraction of a tooth an empyema appears evident that previously has given no particular signs of its presence, nevertheless it is perfectly possible that the empyema could have lasted several years. The communication between the teeth and the antrum can have grown up, and this be reopened by the extraction of the tooth. I think that in many cases of chronic empyema this is just what happens.

Coming next to the other theory, namely, that the inflammation can pass from the nose directly to the antrum, I think that the majority of the present-day authors would rather hold to the preponderance of the nasal origin of antrum trouble.

The anatomist Zuckerkandl considered that antral empyemata of dental origin occurred very seldom. In his anatomy of the nose he speaks of the importance of the dehiscence of the infraorbital canal in the antrum, and states that in such cases the entire tract of the tooth nerves is in direct relationship with the antrum covering, and in case of disease of the sinus the mucous membrane can be pressed upon or infected. When this occurs, there would, of course, be pain, first referred to the tooth and supposed to be a toothache, especially if there should happen to be on that side a bad tooth. As a proof of his belief that the inflammation could pass directly (especially purulent inflammation) from the nose to the antrum, the following facts are cited:

First, the presence of cases of empyema that followed sound teeth.

Second, purulent inflammations of the sphenoid and frontal sinus.

Third, the presence of primary and inflammatory inflammation of the nasal mucous membrane.

Dmochowski examined three hundred and four maxillary sinuses without seeing a single case of empyema of dental

origin, although he always chiselled away the maxillary process.

In thirty-nine upper jaws examined by Weichselbaum he found the first bicuspid carious in six cases, absent in eight cases, sound in twenty-five cases; second bicuspid, carious in ten cases, absent in seven cases, sound in twenty-two cases; first molar, carious in fourteen cases, absent in eleven cases, sound in fourteen cases; second molar, carious in nine cases, absent in nine cases, sound in twenty-one cases.

Krause considered that carious teeth did not bring about empyema.

Jeanty, in twenty-one cases where there were carious teeth, in connection with twenty-two cases of empyema, considered that in no case were the teeth the causative factor.

Moreau, in twenty-one cases of empyema, found only eight connected with caries of the teeth.

Killian reports forty cases of inflammation of the antrum—fifteen men, twenty-one women; with forty-four antral empyema—eighteen right, twenty-six left. Concerning the dental origin, the history of many was in doubt. Several thought the disease to have been due to ulceration of the teeth or brought about by tooth extraction. In several cases there was not the slightest complaint of the teeth. In four acute cases three had toothache; one with entirely sound teeth. Killian thinks the only way to get solution of the problem is not through the varying clinical observations, but through direct pathologic and anatomic examinations to find a direct way in which an inflammation can travel from the teeth to the mucous membrane of the antrum, by examination of properly prepared specimens as well as through bacteriologic work.

In four of Killian's patients, after extraction of the teeth there was direct communication with the antrum. In two there were only a very mucous membrane and a very thin bony layer between the tooth and the antrum. In this case it was the second bicuspid; in four it was the first molar, and in another the second molar.

As the observations seem to render probable the infection of the antrum from diseased teeth, one has also to think, in the case of inflammation from the teeth (especially in cases where the bottom layer or even the mucous membrane of the antrum touched the tooth), whether, as a matter of fact, an empyema must be produced. Killian doubts this, for an abscess at the root of the tooth can last a long time without breaking through

into the antrum. In such a case the mucous membrane itself can be pushed far forward, and it is also possible to imagine that the tooth can be extracted and the abcess wall opened without breaking through into the antrum. In the case of granulations or fungosity of the roots, as in the case seen by Killian, where the second bicuspid was carious with a hazelnut granulation on the root, this opened directly into the antrum, and after its extraction there was a correspondingly large communication between the alveolus and the antrum; nevertheless the washing out of the antrum gave no sign of any pus.

Finally, one must also consider the possibility that an inflammation of the nasal mucous membrane itself can be brought about as a result of the antrum empyema, the same way as by influenza. If the nose is absolutely sound; if influenza and the like can be ruled out, and where there is nothing to be considered except the diseased tooth, then it is more than probable from the clinical stand-point that the tooth was the cause.

Hajek, one of the principal workers at the present time in rhinology, thinks the presence of an alveolar sinus with a very thin lamella of bone over the tooth to be the principal cause of the origin of dental empyema. The infection of the antrum can be brought about by abscess of the tooth, inflammation of the pulp as the result of caries or from filling, purulent inflammation of the periosteum of the alveolar process, and cysts of the root with purulent contents. Oftentimes the empyema manifests itself through the extraction of a tooth because at the same time the antrum is opened and allows the pus to come out. In only thirteen cases out of approximately two hundred antrum cases that Hajek has seen in the last eight years, does he regard the origin of the same to have been due to dental cases.

Zuckerkandl and Dmochowski also advance the proposition that it is perfectly possible that many cases of empyema may be not the result of the tooth affection, but, on the contrary, that the tooth affection may be the result of carious and pathologic processes in the antrum itself, since the nerves and vessels of the antrum which supply a portion of the teeth have direct relations with the soft parts of the maxillary sinus, the deeper parts of the bone.

I have quoted thus somewhat freely from Strubell's article, interspersing it with comments of my own, because the subject is one of considerable importance, and I think these quotations show that any definite statement in the mass as to whether emp-

yemata are of dental or nasal origin is positively worthless. Each individual case must be worked out for itself, and it is in the working out of the individual case that I think the co-operation of the rhinologist and the dental surgeon is required. The dentist must not lose sight of the fact that many cases of empyema are of extra-dental origin; the rhinologist must not lose sight of the fact that not all cases of empyema are of nasal origin.

Coming from foreign to American authors, I think it will be found, on careful scanning of the latest literature, that the prevailing opinion among rhinologists is coming to be that the majority of cases are of nasal origin. In Cryer's book on the "Anatomy of the Face," he states, page 73: "This close proximity between the apical portions of the roots of the teeth and the sinus gives the impression that the maxillary sinus is oftener infected from diseased teeth than from any other source, some authorities claiming that three-fifths of the diseases of the antrum are brought about in that way. The writer thinks this is a mistake. Though recognizing that diseases of the antrum do arise from the teeth, he believes that, aside from constitutional diseases and malformations, it is more often through the common communication between the nasal chamber, the frontal sinuses, the ethmoidal cells, and the maxillary sinus that infection is conveyed to the antrum from diseased cells and sinuses above it. It is the writer's observation that there are more cases in which teeth are lost through diseases of the antrum than cases in which the teeth are primarily diseased, causing infection of the antrum and associated cells.

"Pus or infected matter will, of course, pass in the direction of the least resistance. When the investing tissues of a tooth become so infected, the osteogenetic layer of the muco-periosteum stimulates renewed activity, with the result that a new layer of bone is produced by it which covers these parts and protects this cavity so that abscesses, with but few exceptions, point and break into the mouth.

"Careless operation by the dentist sometimes causes infection of the sinus, as drilling through the tooth and the floor of the sinus, or forcing the root of a tooth into the sinus, through fracture of the wall in an unskillful effort to extract, or carelessness in driving artificial crowns or bridges upon the teeth or roots."

I have tabulated thirty-one cases of empyema of the antrum seen by me in private practice in the last eight years, with the

following results: Sixteen of them were chronic cases of undoubted nasal origin in connection with general ethmoiditis, with inflammation of the frontal sinus, or with atrophic rhinitis. One of these had syphilis, but the syphilis seemed to be a coincident condition rather than in any way the cause of the general ethmoiditis. Three were the result of influenza of nasal origin. One was traumatic, the result of a railroad injury. One was luetic, the syphilis causing a breaking down of the naso-antral wall on one side and a great thinning of it on the other. Six were of undoubted dental origin, while three were possibly of dental origin. Or, reduced to percentages, 64.6 per cent. were undoubtedly of nasal origin; 29 per cent. of possibly dental origin; 3.2 per cent. traumatic; 3.2 per cent. luetic.

It is extremely difficult in many cases where the empyema is a chronic condition and diseased teeth and general ethmoiditis are both present to determine which was the primary cause and which was a coincident or subsequent condition. Since carious teeth are very common in persons who do not have and never have had any nasal trouble, it is quite possible that the two processes can work along independently of one another. I think this probably occurred in one of the cases which I have stated to be of dental origin, and that really the nasal condition was the primary cause. In one of the cases which I have stated as distinctly of dental origin, this might reasonably be doubted, as no distinct trouble could be found with the tooth on its removal, and the dentist who removed it hardly considered that there was anything the matter with it. At the same time there was no general ethmoiditis, and the removal of the tooth relieved the condition of pain which was present in the antrum. On the whole, I think that in my analysis I have allowed quite as many of my cases to be of dental origin as the facts would warrant. In a recent article, "Pus in the Nose," (*Medical News*, December 24, 1904), I stated that I thought my experience had shown that approximately fifty per cent. of my cases were of dental origin, but a careful scrutiny of them shows this percentage to have been altogether too high. From twenty-five to thirty per cent. is probably much nearer the correct figure.

There are many cases of acute inflammation of the antrum of influenzal origin which are seen by every rhinologist, but of which no account is made here. In the three acute cases which I have tabulated pus was actually washed out of the antrum. The acute cases in which there were antral pain and

all the symptoms of acute non-purulent inflammation of the antrum I have disregarded.

So much, then, as to the origin of these affections. We come next to an equally important section of the subject: What shall be the treatment of the empyema of the antrum when the diagnosis is made? If we look up the history of cases reported even as late as five or six years ago, we will find that, preceding the days of more radical nasal surgery, the majority of these cases were all treated through openings through the alveolar process made by the extraction of the tooth, with an enlargement of the opening and its maintenance by means of a tube. In process of time a good many of them got well. Others, however, were condemned to wear the tube almost indefinitely. Tilley reports only five cases out of twenty-two that could give up the tube after having used it a long time. Of twenty-seven alveolar cases, fifteen had worn the tube with careful irrigation for at least six months. One patient had worn it ten years; another three and one-half years, and another two years.

I think we have now come to the point where this method of treatment in cases which have lasted any length of time must be considered as distinctly obsolete. Any one who has done a number of radical operations on the antrum, and has seen the character of the degenerated mucous membrane which is found there, often the entire antrum being filled with numerous polyps and various low formations of granulation tissue, will thoroughly appreciate the uselessness of expecting to get any cure through a small tube opening into the mouth, even though that tube may satisfactorily drain the pus. Again, why should a patient be compelled to syringe out his antrum, day in, day out, when a radical operation, the healing of which will be complete in a few weeks, can be performed and the case be disposed of once for all?

Without discussing further this subject of treatment as to its pros and cons, I will tell you the method which I am in the habit of pursuing and which I believe, in the light of our present knowledge, is the proper one. Given a case of supposed antral empyema, first, as to diagnosis. The presence or absence of pus can be determined pretty quickly and very easily by puncturing underneath the inferior turbinate as high up as possible and at the junction of its anterior and middle thirds, although there will be a few cases in which the antrum may be so filled with polypoid growth, with comparatively small secretion, that

the diagnosis here may for a short time be somewhat in doubt. In most instances, however, the diagnosis is definite enough.

In the second place, have the case examined carefully by a dentist to see if there is any trouble with the teeth. If the tooth is at fault, extract it. See whether it opens into the antrum. Assuming that it does and that the tooth is the causative factor, is the antrum acutely or chronically affected? If acutely affected, it will get well in a short time with daily washings out with the usual antiseptic fluids. If it lasts more than a reasonable time, two or three weeks, or even less, without manifest cessation, I regard the case as chronic, and further treatment by way of the teeth as useless. At the same time that the dentist was treating the teeth, if the patient was under my own observation, I should have enlarged the original exploratory opening made in the nasal wall of the antrum, by means of curettes and alligator cutting forceps, so as to get a free opening from the antrum into the nose, thus securing free drainage, which drainage is very much superior to that through the mouth. The short curettes, bent slightly on the shank, which are used for the radical mastoid operation and are of various sizes, and the smallest and second size Myle's alligator cutting forceps answer very well for this purpose. If the case lasted any considerable length of time, I should next do a radical operation, taking off, under ether, sufficient of the front wall of the canine fossa, so that free inspection of the antrum cavity could be had; its entire contents, including the mucous membrane, removed if necessary, and a large counter-opening then made directly into the nose underneath the anterior end of the inferior turbinate; the natural opening also enlarged, and the whole antrum cavity packed with gauze. The canine fossa opening is allowed to close in a few days, thus sealing off the cavity of the mouth, and the nasal opening is retained as the permanent one. The details of this operation I have described in my book on the nose and throat* and in the article already referred to in the *Medical News.*

This operation, of course, lies in the province of the rhinologist rather than of the dentist, but the entire working out of the pathology and treatment in the borderland cases should be made by the dentist and the rhinologist together.

There is another class of antrum cases which might have been considered in our discussion of the etiology—namely, those in

*Nose and Throat Work for the General Practitioner, N. Y., 1903.

which the antrum is infected from the frontal sinus by reason of the drainage of the pus from frontal sinus empyemata, down through the infundibulum, and then into the natural opening of the antrum, or directly into the antrum, a condition which occurs, and so frequently that I now believe that all cases of radical operation of the frontal sinus should have at the time of operation, or previously, exploratory puncture of the antrum to determine whether or not the antrum is at the same time affected.

The after-treatment of the cases in which a radical operation is done is comparatively simple, does not last a great while, and has in my hands been invariably successful.

REPORT OF 31 CASES EMPYEMA ANTRUM.

Name.	Age.	Sinus involved.	Operation.	Date first seen.	Date last seen.	Result.	Remarks.	Origin.
Mr. F. W. N.	32	R. frontal. R. antrum.	Right frontal operated on by external incision. Antrum washed out.	Nov. 4. 1898.	Jan. 7. 1901.	Cured so far as known.	Antrum was originally free from pus: became infected from frontal.	Nasal.
Miss M, B.	25	R. antrum.	Exploratory puncture underneath inferior turbinate. Daily washings.	Sept. 25. 1896.	May 11. 1897.	Cured so far as known.	Had atrophic rhinitis also.	Nasal.
Mr. D H. C.	66	R. anrrum.	Exploratory puncture under inferior turbinate. Silver canula. Daily washing.	Oct. 3. 1896.	Mar. 14. 1898	Cured so far as known.	In apparently good health.	Nasal.
Mr. W. H.	32	R. antrum.	Nov. 4, 1902, puncture of antrum showed pus. Daily Washing without effect. Dec. 15, 1902, radical operation through canine fossa with extraction of first molar tooth.	A p r i l 18. 1898. Complained of catarrh.	May 28. 1903.	Cured.	First molar tooth penetrated floor of antrum and had a pus pocket attached. Antrum walls not specially diseased.	Dental.
Mrs. S.	64	L. antrum.	Exploratory puncture; daily washings f_r two months. Improved, but no cure. Then removed second molar, and made large incisions through the alveolar process. Cured in few days.	Feb. 5. 1897.	May 3. 1897.	Cured.	Complained at no time of tooth which was filed with amalgam.	Dental.
Miss J. S.	24	R. antrum.	Puncture underneath the inferior turbinate and washed out cavity.	June 17. 1899.	Dec. 9. 1899.	Slight discharge at time case lost sight of.	No trouble with teeth. Antrum very small.	Nasal.
Mr. G. D. F.	26	R. antrum. and R. frontal.	Washed out antrum to no purpose; then did radical antrum and radical fro tal.	June 21. 1899.	April 6. 1904.	Cured.	Case traumatic in origin from railroad accident,	Traumatic.
Mrs. M. G.	37	Both frontals. Both antra.	Various operations on frontal sinuses: antra secondarily infected from these.	Oct. 17. 1899.	July 12. 1904.	Cured.	Extensive ethmoiditis several years duration.	Nasal.

Mrs. F.	41	L. antrum.	Radical from antrum through canine fossa, syringing having failed to effect a cure.	Dec. 13, 1899. Then occasionally to Ap. 11, 1904, when radical operation was done.	Oct. 28, 1904.	Cured.	Originally thought was case atrophic rhinitis simply. Pain from pressure on infraorbital nerve a prominent after-symptom. Disappeared in three weeks.	Nasal.
Mr. M. S.	24	L. antrum. L. frontal.	March 7, 1900, radical through canine fossa. Antrum filled with soft, pulpy granulation tissue. Second bicuspid absent.	Mar. 2, 1900	Sept. 1904. Antrum clear.	Cured as to antrum by first operation.	Frontal was afterwards operated on and again three years later. Permanent cure now effected.	Nasal.
Mrs. N. A.	25	R. antrum.	Radical through canine fossa and also through alveolar process at at site first bicuspid previously removed.	June 9, 1900.	Aug. 4, 1900.	Cured.	First and second bicuspids and first molar absent at time of operation.	Nasal or dental (probably dental).
Mrs. A. C.	39	L. antrum.	Radical through canine fossa and also through alveolar process at site first bicuspid previo sly removed.	June 12, 1900.	Nov. 4, 1902.	Cured.	Wore gold tube through alveolar opening for awhile as no opening was made into nose. It would have been better to have made one.	Dental.
Miss M. D.	29	L. antrum	Exploratory puncture.	April 5, 1902	Under treatment for atrophic rhinitis, but antrum has no pus.			Nasal.
Miss A. A.	24	L. antrum.	Exploratory puncture.	Oct. 23, 1902.	April 16, 1903.	Cured.		Nasal.
Miss H. D.	26	Both antra. Had general ethmoiditis with polyp formation.	Radical both antra. April, 1904.	Nov. 21, 1902.	Sept. 3 1904.	Cured.	At time of operation three carious roots were found penetrating left antrum. As both antra were diseased and no trouble with teeth on right side, doubtful if tooth was cause.	Probably nasal, perhaps dental.
Miss O. M.	17	R. antrum. R. frontal.	Radical operation frontal sinus and antrum.	Feb. 11, 1902.	June 9, 1903.	Cured.	Operated on frontal first, then did radical anirum as pus discharge did not stop. Think frontal infected antrum.	Nasal.

Mr. W. G.	29	R. antrum, R. frontal.	Radical for each.	Mar. 22, 1903.	Dec. 14, 1904.	Apparently cured.	Impossible to say whether frontal or antrum primary source of trouble. Had general ethmoiditis.	Nasal.
Dr. G. L. R.	40	L. antrum.	Exploratory puncture. Daily washing.	Jan., 1903.	Three weeks duration.	Cured.	Absolute cure in three to four weeks.	Nasal (influenza).
Mr. A. J. F.	25	R. antrum.	Exploratory puncture.	Mar. 10, 1903	Mar. 12, 1903.	Cured.	Acute case influenzal orgin.	Nasal.
Mr. E. P.	21	Both antra.	Exploratory puncture L. Right side naso antral wall already perforated.	June 27, 1903.	Nov. 7, 1903.	Improved.	Result tertiary Lues.	Luetic.
Mr. L. W. J.	24	Both antra. Both frontals.	Radical operation all four cavities June 17, 1903. All sinuses filled with polypi and degenerated mucous membrane.		Dec. 1904.	Cured apparently.	No tooth complications	Nasal.
Mr. M. W. M.	25	L. antrum. L. frontal.	Exploratory puncture antrum showed pus. Frontal sinus also involved.	Oct. 24, 1903.	Nov. 24, 1903.	Relieved.	Middle turbinate was removed. This improved drainage. No other treatment allowed.	Nasal.
Mr. H. S. H.	35	R. antrum.	Radical operation R. antrum.	Feb. 10, 1903.	Dec. 22, 1903.	Cured.	Luetic with general ethmoiditis and polypi each nostril. No tooth symptoms.	Nasal. Luetic.
Miss E. A.	49	L. antrum.	Removed portion middle turbinate followed by radical antrum operation.	April 21, 1903.	July 14, 1903.	Cured.	Had first molar tooth pulled but root found to be healthy and not penetrating antrum.	Nasal.
Mrs. W. W.	68	R. antrum.	Exploratory puncture daily washings; removal middle turbinate.	Nov. 19, 1903.	Dec. 12, 1903.	Improved.	Had many nasal polypi and extensive ethmoiditis. On account of very poor general health no further operation allowed.	Nasal.
Miss M. T.	32	L. antrum.	Exploratory puncture and daily washing out with canula.	March 5, 1904.	March 19, 1904	Cured.	Acute case from influenza. No return eight months later.	Nasal.
Miss F. H.	36	R. antrum.	Second bicuspid extracted; showed old inflammation at root but did not penetrate the antrum. Then drilled into antrum. This opening closed in two days. The exploratory opening from the nose then enlarged with curettes and cutting forceps.	May 24, 1904.	Sept. 3, 1904.	Cured.	This may have been primarily of dental origin as pus had lasted some time. After establishing free nasal drainage cure was rapid.	Nasal or dental.

Mrs. N. B. B.	50	R. antrum.	Removed first molar; showed root abscess with opening directly into the antrum.	April 18, 1904.	May. 20, 1904.	Cured.	After treatment through root cavity only.	Dental.
Mrs. D. V. C.	30	R. antrum.	Exploratory puncture through nose. Second bicupsid, a capped tooth, then removed. No abscess, but penetrated antrum.	April 2, 1904.	April 15, 1904.	Cured	Influenza closed natural opening. Pus probably of dental origin, but gave no sign. Many patients do not notice slight purulent discharge, considering it a symptom of what they call catarrh.	Dental.
Mr, W. E. Y.	37	R. antrum.	Exploratory puncture under inferior turbinate. Removed second bicuspid. No apparent connection with antrum but relieved pain. Cut away portion naso-antral wall with cutting forceps.	April 23, 1904.	Sept. 10, 1904.	Cured.	Had complained of catarrh for some time with some discharge.	Possible dental. No ethmoidal trouble.
Miss H. C.	23	Both antra.	Cut away naso-antra wall under each inferior turbinate.	Dec., 1904.	Feb., 1905.	Apparently cured.	Had extensive ethmoiditis and polypi. Removed anterior end each middle turb. All 7 teeth sound.	Nasal.

XI.

MY RESULTS FROM THE TREATMENT OF VERTIGO, TINNITUS AND DEAFNESS BY BABINSKI'S METHOD.

By Dr. Tretrop,

CHIEF OF THE CLINIC, ANTWERP HOSPITAL.

Shortly after Babinski's communication upon the treatment of ear affections and especially of auricular vertigo by rachicentesis[2], last February, I began a systematic study, both in my private practice and in my hospital clinic, of cases to which the method was logically and scientifically applicable, and it is the result of this personal clinical study which I desire to give you to-day.

But before doing this, it will not be out of place to sum up in a few lines the origin of this method and what it has yielded at the hands of its author.

The idea of applying rachicentesis to the treatment of functional diseases of the ear was with Babinski, as he said himself, the result of a syllogism. In the course of a physiologic study of voltaic vertigo Babinski was led to inquire into the vertigo of pathologic cases.

If the electrodes of a continuous current of a few milliamperes are applied to the temples or mastoid processes in a normal subject, the passage of the current causes vertigo, nausea and nystagmus. Moreover, the head inclines toward the positive pole side.

Physiologists were not agreed as to the mechanism of this action of the current. To elucidate the matter Babinski had recourse to what occurred in patients with ear disease, and he found in a general way "in unilateral lesions the inclination usually predominates toward the diseased side, or even does not take place except upon this side, whatever the direction of the current."

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(1) Communication to the Annual Meeting of Belgian Specialists, Brussels, June, 1904.

(2) Babinski—Annales des Maladies de l'Oreille, Febraury, 1904.

Knowing, furthermore, that hysterical deafness does not give this reaction, our distinguished confrere concluded that voltaic vertigo was occasioned by excitation of the labyrinth. which, as we know, is not involved in deafness of hysterical origin.

In patients with normal ears, submitted to rachicentesis for cytologic diagnosis, Babinski found that resistance to voltaic vertigo was diminished after the operation, and he then made the following syllogism:

(a) Voltaic vertigo has its origin in excitation of the labyrinth.

(b) Rachicentesis affects voltaic vertigo.

(c) Therefore rachicentesis affects the labyrinth.

The method utilized is that familiar to you as generally applied for cytodiagnosis or rachicocainization.

Rigid asepsis of the region, the instruments, and the hands of the operators is necessary.

The quantity of fluid withdrawn at first was 4 to 6 cubic centimeters; later it was increased to 15 or 20 cubic centimeters.

I punctured all patients in the lateral decubitus, after anesthesia of the skin with the coryleur, and did either a Quinicke or Chipault puncture, indifferently. Punctures were made upon 15 persons, some of whom were punctured several times.

The quantity of fluid withdrawn at one time varied from 6 to 18 cubic centimeters. During the puncture, aside from a few frightened patients with a syncopal tendency, I have not observed anything special. The pain is almost nil: it is only felt at the moment of penetrating the skin and when the needle is withdrawn. Under ethyl chlorid many persons do not even feel it.

The functional results have been encouraging. The vertigo was regularly influenced and generally disappeared completely.

The tinnitus followed a similar course and, taking my statistics at present, I would be tempted to say that it has almost disappeared like the vertigo.

As to the deafness, in three cases I obtained without any doubt an unexpected result.

I submit herewith some illustrative cases with their acoumetric tables.

Millimetric Auditory Scale of V. Julienne.
(Measured by Dr. Tretop's Acoumeter.)

	Mar. 8, 1904.	(1) Apr. 14, 1904.	(2) Apr. 25, 1904.	Notes.
Right Ear				
Watch	—	—	—	(1) Eight days after the first puncture.
Fork	—	5	35	
Music	—	—	—	
Voice	—	—	—	(2) Ten days after the second.
Left Ear				
Watch	83	—	—	Hears loud voice, at 40 centimeters.
Fork	181	—	—	
Music	124	—	—	
Voice	95	—	—	

Millimetric Auditory Scale of B. Marie.
(Measured by Dr. Tretrop's Acoumeter.)

	Mar. 8, 1904.	May 17, 1904.	May 31, 1904	Notes.
Right Ear				
Watch	—	—	—	Marked deafness for 3 years.
Fork	0	52	57	
Music	—	—	—	
Voice	—	—	—	Hears loud voice at 50 centimeters.
Left Ear				
Watch	—	—	—	
Fork	40	46	49	
Music	—	—	—	
Voice	—	—	—	

Millimetric Auditory Scale of G. Marie.
(Taken with Dr Tretop's Acoumeter.)

	(1) Feb. 25, 1904.	(2) May 31, 1904.	Notes.
Right Ear			
Watch	—	—	(1) Before puncture.
Fork	—	39	
Music	—	—	
Voice	—	—	(2) After puncture.
Left Ear			
Watch	52	88	
Fork	75	168	
Music	21	78	
Voice	15	68	

The acoumetry, taken before puncture and after with the aid of the millimetric acoumeter which I exhibited to you in 1902, leaves no doubt as to the considerable improvement in hearing.

Case I. V. Julienne, aged 16 years, total right deafness for three years, accompanied by vertigo and vomiting. Headaches frequent.

October 14, 1903, when I saw her first, I found that not only was air conduction abolished on the right side, but bone conduction likewise. The fork applied to the mastoid was not heard.

After persevering and continuous treatment the cranio-tympanic conduction reappeared slightly, but this was all I could obtain.

At the beginning of April, I withdrew by rachicentesis about 7 cubic centimeters of fluid in previously measured sterile tubes. A few days later the patient heard loud voice on the affected side at 20 centimeters, the good ear being hermetically closed.

About the middle of April I made another lumbar puncture. Under pressure the fluid made a jet 8 to 10 centimeters long. I took away about 10 cubic centimeters of very clear fluid.

The postoperative headache was less than before and the hearing again increased to 40 centimeters for loud voice.

Herewith is a table of this patient's hearing distances before and after the operation. The result of the treatment is free from suggestion or simulation.

Case II. B. Marie, 27 years, formerly adenoidal, attacked with deafness for fifteen years with tinnitus and vertigo. Previously treated unsucessfully. I withdrew by lumbar puncture about 16 cubic centimeters of very clear fluid.

Three days later the vertigo disappeared, the tinnitus also; there remained, said the patient, a slight humming. The patient claimed to have considerable relief in her entire head.

As to the deafness, it is so much improved that all her companions have remarked that she hears conversation better than ever before, even by approaching very near and inclining her ear. She voluntarily states that she has not heard for fifteen years as well as she does now.

Herewith is her acoumetric table which clearly shows the progress attained. It is to be noted that I had previously treated this patient by the usual methods, without the slightest success.

Case III. G. Marie, 20 years, attacked over a year ago with total right deafness, accompanied by nausea, vertigo

and vomiting, against which all treatment was, if not wholly a failure, at least very slightly effective.

I withdrew by lumbar puncture about 15 cubic centimeters of cephalo-rachidian fluid. The patient was considerably affected for a few days; she was obliged to stay recumbent; there was loss of appetite, intense headache and insomnia; the attacks of vomiting did not stop during the first week. Then everything improved and the patient, who heard absolutely nothing before on the right side, was able to hear loud voice. She voluntarily testified to a manifest improvement in her hearing. The considerably impaired hearing on the left side was also markedly increased.

The acoumetric table attached, giving exact measures before and after operation, shows the increase obtained.

Case IV. Although lumbar puncture failed, this case deserves to be related briefly because of its clinical rarity.

A young sailor, robustly built, was attacked with total deafness in the course of typhoid fever. The deafness coincided with the administration of an ordinary dose of quinin.

Investigations which I have made into the ears of subjects dead of typhoid, have frequently revealed intense congestion of the whole organ and especially of the labyrinth. Hermorrhagic exudates into the tympanum are not rare. Did the quinin, which has been accused of producing congestion of the labyrinth but is now believed to decongest the internal ear, have any effect here? It is a difficult question to answer. No lesions of the tympanic cavities could be determined, but there was marked pallor of the entire membrane, notable in the region of the hammer handle.

Although there were no symptoms of labyrinthine irritation but rather of a deep lesion, after various unsuccessful treatments I believed that I was justified in trying rachicentesis on the patient, who had become incapable of taking up his work and earning a livelihood.

The first puncture, at the beginning of April, yielded 12 cubic centimeters of very clear cerebro-spinal fluid which came out under pressure. The results were nil; no headache but no improvement. I punctured him again later, taking away about 18 cubic centimeters of fluid. The patient reacted more than before but he remained absolutely deaf both by air and bone conduction. It is therefore to be feared that the labyrinth is permanently impaired.

Case V. This history clearly proves what may be ob-

tained by lumbar punctures in cases of inveterate vertigo and tinnitus, dating back for years and treated without much improvement by other methods.

This was a police officer whom I presented last May before the Antwerp Medical Society. He was in good general condition, aged 50 years, in service 27 years, and was attached three years ago with vertigo, tinnitus and deafness. He had undergone treatment by non-specialists without success and though I had temporarily improved his condition in my care of him for a year, I had not removed his anoying symptoms. Nausea was not rare, Romberg's sign was clearly marked. During the latter months the symptoms were so aggravated that at times the patient found himself unable to perform his duties.

I did lumbar puncture and withdrew only 8 cubic centimeters of fluid which oozed out drop by drop. At the fifth centimeter he had a sensation of fainting.

The puncture was followed by pain in the neck and back which obliged him to lie abed for several days. Then his head became easy, the vertigo and tinnitus disappeared completely. The deafness has changed very little, it has rather slightly improved. There is also in this patient a progressive atresia of the auditory canals, especially the left.

As the patient himself declared to the Antwerp Society, he feels totally different since the operation. He is extremely happy at the complete change in his condition, and he has again taken up his work with a satisfaction which he has not had for three years.

I have punctured cases of syphilitic labyrinthitis and deafmutism without observing any results up to the present which merit reporting. Many of them are too recent, and, furthermore, Babinski reports only one striking success out of 106 cases.

From the viewpoint of deafness, I have had a fortunate series, possibly in part because of specially chosen patients. Babinski claims 13 per cent of improved hearing in 106 cases. Personally, I have 3 cases in 15, or 20 per cent, but my series is too small to establish a percentage.

To sum up the Babinski method of treatment according to the data of the author and my own personal experience, I would say:

1. In cases of labyrinthism, accompanied or not by lesions of other parts of the auditory organ, when other

treatment has no effect, we are justified in proposing lumbar puncture while telling the patient that is not a panacea, but a method that gives a percentage of cures and also failures.

2. The attacks of vertigo which are often so annoying are the most favorably influenced, then comes the tinnitus, and lastly the deafness.

In is proper to say here, parenthetically, that the persevering and judicial use of Delstanche's masseur-rarefier, by decompressing the labyrinthine liquid, may in similar cases yield unexpected results, as I have myself observed in some cases where the symptoms made existence a burden. But its use by the patient himself must be discouraged, as he will employ it indiscriminately and only do harm.

2. Deaf-mutism appears to me amenable to this method. It has a better chance of success if a careful examination shows that some internal ear perception still exists and that the latter can be developed by appropriate medico-educative treatment. The method can be advised only as a chance of cure, without promising anything.

In both classes of cases—pure labyrinthine affections and those complicated with deaf-mutism—careful examination, noting the lesions and measuring the hearing power, is necessary before operation if errors would be avoided.

Pure labyrinthine affections are most effectively influenced.

What are the dangers in or contra-indications to rachicentesis? Babinski tells us: "Rachicentesis, being without danger and not exposing patients who undergo it to any aggravation, should be attempted, unless specially contraindicated, in all persons having aural trouble which are refractory to the various methods of local treatment."

This conclusion is very broad, and perhaps exceeds the intent of its author. Taken literally, since it is not stated how soon the local treatment may be considered ineffective, puncture would be done upon a great number of patients.

The contra-indications to lumbar puncture have been too thoroughly set forth to speak of them again here. So far as the mind is concerned, a question which was raised by parents of my child patients, there is no reason to have the least fear. In Babinski's cases where mental troubles coexisted the mind was regularly improved.

For safety it would be well, in doubtful cases, not to do lumbar puncture without assistance. In fact it is quite

convenient to have a practitioner watch the pulse and respiration while the operator, relieved of this care, proceeds to do the pucture and take away the fluid.

Personally, aside from the more or less prolonged headache, occasionlly rather persistent nausea and vomiting, well known symptoms, sometimes suggesting meningitis by their intensity, but always disappearing, I have not observed anything special. I performed puncture with my patients reclining and the skin anesthetised by the coryleur. The pain, even in children, was nil, one might say. As to operative sequelae, with rigid asepsis of hands, instruments and the operative field, I have had none. To dress the wound and prevent infection, iodoformized collodion and a little wisp of sterile cotton are excellent.

Otology is about to be enriched, then, with a new procedure which in certain definite cases may cause vertigo and tinnitus to disappear and sometimes even to improve deafness materially.

XII.

LUMBAR PUNCTURE AND AFFECTIONS OF THE EAR.[1]

By E. Lombard,

oto-laryngologist to the paris hospitals, and

H. Caboche,

formerly assistant in oto-rhino-laryngology in the lariboisiere hospital.

In this paper we desire to make known the results which we have obtained in certain ear affections, such as dry adhesive otitis with deafness, tinnitus and vertigo, by lumbar puncture, after Babinski's method, and the conclusions which they suggest to us.

For this therapeutic study we were careful to choose from the hospital clinic cases which were as clearly defined as possible. It adds interest, we think, in order to estimate the therapeutic value of this method, to address ourselves to cases in which purely otologic treatment is incapable of giving results.

It is common to see tubo-tympanic catarrhs, untreated or insufficiently treated, accompanied, beside deafness, with tinnitus and vertigo; symptoms which disappear after inflation of air through the Eustachian tube or by methodical bougieing of the tube. We have also, in the course of our research, met with several cases where rachicentesis had been proposed, but which were easily cured by the above means.

On the other hand, it is not rare to see cases of deafness where the lesions are mixed, and where to the usual lesions rule where the catarrhal element intervenes, may pervert

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of otitis sicca are added catarrhal lesions of the tympanic mucosa. With the variability of symptoms, which influences the interpretation of results, we have also eliminated this class of cases.

Chance and the rarity of the affection have prevented us from finding cases of deafness and vertigo where, without middle ear lesions demonstrable objectively or by hearing tests, the labyrinth alone appears to be at fault (pure nerve deafness); so we have confined ourselves to dry otitis with or without labyrinth insufficiency. But here again we have tried to pick out cases clearly diagnosticable, and to establish the seat and degree of the lesion. If this manner of procedure has somewhat restricted our field of experiment and resulted in a perhaps fastidious extent of observation, we hope nevertheless to have performed useful work, for only precise observation permits comparison and exact appreciation of the results obtained by different authors.

For the various tests which we have made we have constantly employed the same instruments:

A fork of which the average duration of air and bone perception, for us, is 60 seconds (air) and 30 seconds (bone). The values obtained are of course only relative to our own hearing.

A watch which, by a large number of subjects with apparently normal hearing and in the room where we work, is heard at over five meters.

Finally, for hearing tests with loud or whispered voice, we have never employed phrases where the possibility of guessing was too great, but only words, always the same, made up mostly of consonants (tambour, tampon, bonbon, planche, tranche, manchon, bouchon, etc.), so as to make the results comparable.

Case I. Otitis sicca. Immobility of the first ossicles. Tinnitus. Vertigo. Subjective improvement, immediate but not permanent, of the tinnitus.

Mme. Sch——, forty-five years, deafness, tinnitus and vertigo. The deafness and tinnitus dated back ten years; the vertigo since September or October, 1903.

The deafness came on gradually; she did not notice it; her companions noted that she often made them repeat. The deafness was less noticeable out of doors in the noise.

The tinnitus came on at the same time as the deafness, at first not severe and occurring alternately in each ear.

It now exists (Feb. 12, 1904) in both ears, very intense, night and day. It is less severe in the left ear. Does not prevent sleep. Accompanied with bilateral frontal headache.

The vertigo occurs, at the maximum, three times a week, often once or twice a week; when it comes on (usually in the morning) everything appears to turn around, and she is obliged to sit down or support herself by some object, but there is never any falling. At the same time the tinnitus becomes more intense.

All causes producing congestion of the head, heat, reading, attention, increase the tinnitus.

Her husband had had pulmonary tuberculosis and syphilis but the patient appears not to have been infected. No abortions; five children died in convulsions at six weeks, two months and two years, the eldest aged twenty-two years. These children were all healthy at birth and without trace of syphilis.

The patient is rather corpulent, face red and full; the cheeks show varicosities like those of heart trouble (no cardiac lesion). Very nervous, no pharyngeal reflex; no very characteristic stigmata of hysteria.

The tympani on both sides are a little opaque. The mallei have normal position and inclination, but are completely immobile.

The tubes are permeable.

The hearing-tests gave the following results:

	Right Ear.		Left Ear.	
	Before Politzer.	After Politzer.	Before Politzer.	After Politzer.
Watch, air	0	0	0	0
Watch, bone	0	0	0	0
Voice	Shouted, 0	0	Very loud, at contact	0
Whisper	0	0	0	0
Fork, air	0	0	10″	0
Fork, bone	12″, 14″	8″, 10″	14″, 15″	0
Weber			Positive	
Paracusis	Negative		Negative	
Romberg	0	0	0	0
Galton	At the 12 mark is scarcely heard; below this not at all.		At the 12 mark = 2.50 m.; at 10 = 50 m.: below this scarcely heard.	

Siegel. Malleus immobile, right and left.

Tubes. Very permeable.

February 13, 1904, first lumbar puncture. Claimed before puncture to have intense headache, and great tinnitus; had vertigo coming to the hospital.

Ten cubic centimeters of cerebro-spinal fluid were removed, escaping under pressure. At the 6th centimeter she claimed that her head was eased and that the right tinnitus was less. The puncture finished, she declared that she heard no more tinnitus, none at all on the right, the same on the left. The fork by bone shows no change on the left, but the mean duration is 30" on the right. We say mean, for the duration varies considerably in successive examinations; it appears to diminish with the repetition of the tests. Further, as we have verified in a number of patients, it also varies with the point of application of the fork, the maximum occurring when the stem is over the antral region, the minimum at the tip, and an intermediate duration over the temporal region.

February 14, 1904. Hearing no better. The tinnitus has reappeared; however, it is less intense.

February 15, 1904. In the afternoon had been able to speak from her bed with her neighbors, distant about 3 meters, without them having to raise their voice. But we do not rely upon this so-called amelioration; same values for watch, loud and low voice.

February 16. Tinnitus just as severe as before puncture. She rises and walks without vertigo. When, seated upon her bed, she wishes to lie down, "her head appears to be drawn back as if its weight were enormous." No improvement of hearing for voice; however, we note an improvement for the fork by air (12" right and left) and also by bone, but the differing measures and important variations oblige us to strike an average.

February 17. Appearance of the menses.

February 18. The patient says that while not understanding loud voice she hears the sound more clearly in conversation.

The improvement is most manifest in the right ear in which tinnitus is now almost imperceptible. The heaviness of the head has diminished. The tests with the fork by air and bone show the same as before.

In the course of the fork test, we note that the moment the stem applied to the left mastoid ceases to be heard and is taken away, the patient declares that this side is now free and the tinnitus reappears on the right.

February 25. The menses having ceased, another lumbar puncture was done, 15 cubic centimeters being taken, this time with much less pressure. About the 8th cubic centimeter, the tinnitus of the left ear, which had persisted until now, becomes less. "I still hear the bells but not the choo choo." On this same side is noted better audition for words, which are heard (loud voice) at 10 centimeters. Fork, air 14, bone 28.

February 29. The tinnitus in the left ear has returned very strong. In the morning at the bath had vertigo. Words are heard (loud voice at 5 centimeters only). Whispered voice and conversation are not heard.

At the moment when the fork applied to the left mastoid is not heard and is removed, the patient again declares that the tinnitus disappears on the left and is transferred to the right. The right tinnitus having ceased about midday, the left tinnitus recurred with the same itensity. Further, there is not a total disappearance of the left tinnitus but a diminution of intensity.

To sum up, conversation is not heard any better; words spoken with loud voice appear to be heard a little better on the right, but, as the same words usually recur, it must be taken into account that the patient may guess them rather than comprehend. The tinnitus is a little less on the right, not much better on the left. As to the vertigo, it does not appear to have been affected by the treatment, since it has recurred four days after the last puncture.

Revisit, July 29, 1904. No improvement. The tinnitus is constantly severe and there is occasional vertigo. The deafness has increased.

Case II. Otitis Sicca—Immobility of the first ossicles. Labyrinth insufficiency. Deafness. Vertigo. Tinnitus. No improvement.

Louis C., 62 years, deafness, vertigo and tinnitus (service of Dr. Sebileau).

Deafness existed upon both sides. On the right it dated back to the age of six years; he had had otorrhea, vestiges of which remained upon the tympanum. On the left the deafness had begun ten years ago and had come on suddenly. He had taken cold in the head (?), and the following day he was deaf, as deaf as now; the deafness had not increased. He did not recall being hard of hearing before that. The tinnitus appeared almost immediately after.

The tinnitus is extremely intense, sometimes simulating

the noise of a piston, sometimes that of a waterfall. It exists upon both sides.

The patient claims to be in an almost constant vertiginous state. There is particularly a sensation of emptiness of the head; but there is sometimes a severe vertigo which obliges him to seize something to prevent falling; this is accompanied with vomiting. He had had no vertigo before his deafness which he attributed to a worm and which persisted after the disappearance of the latter.

The deafness is pronounced, as may be seen by the following table. It becomes complete in noisy places.

	Right Ear.		Left Ear	
	Before Politzer.	After Politzer.	Before Politzer	After Politzer.
Watch, air	0	0	Contact (barely)	Contact (barely)
Watch, bone	0	0	0	0
Voice	0 (even shouted)	0	.50m .75m	.50m .75
Whisper	0	0	0	0
Fork, air	0	0	Slightly	0
Fork, bone	0	0	6″	6″
Weber			Left	
Galton	The highest sound is not heard. The lowest is heard at contact.		High and low sounds heard only at contact.	

Tubes. Permeable, especially the right.

Examination of the tympani shows:

On the right, in the postero-superior quadrant, a cicatrix in the drum, probably from an old otorrhea. All the antero-inferior quadrant is greatly thickened. The hammer is completely immobile.

On the left, the hammer is also immobile, and the membrane shows sclerosis with thinning. Calcareous degeneration at the center; thinning of portions of the posterior inferior quadrant. The patient is a man of medium height, strong, very stout, has chronic bronchitis, with emphysema, rather pale, having always been subject to vertigo.

No syphilis. Pulse strong, rather tense, without cardiac lesion. Urine normal. Reflexes normal.

We may add that recently he decided to have his ears looked after. For eight months he has been treated by insufflation of air into the Eustachian tube. He had obtained an improvement of hearing (?) but not of the tinnitus.

June 20, 1904. First lumbar puncture. Fifteen cubic centimeters of fluid withdrawn which came out under strong pressure.

During the days following, no improvement, either of the hearing or tinnitus was noted. He had a slight mitigation of the vertiginous sensation, which he continually felt, but he claimed to have headache which he localized at various points, notably the occiput. No change in hearing tests.

July 4. Another puncture of 15 cubic centimeters, which escaped this time with little pressure. No more change than the first time.

July 13. Another puncture of 15 cubic centimeters. The fluid came out drop by drop, very slowly. No more success than the other two times.

To sum up, no change in the deafness, the tinnitus or even the vertigo, which latterly has reappeared in its light form. He continually complains of headache in different spots, which he did not have before the puncture.

Went out July 22, 1904.

Case III. Deafness. Vertigo. Tinnitus. Probable ankylosis of the stapes. Lumbar puncture. Subjective and objective amelioration of the vertigo. Apparent improvement of the hearing, not confirmed by tests.

Mme. G., 54 years, came Dec. 7, 1903, to Dr. Sebileau's clinic at Lariboisiere because of deafness, tinnitus and vertigo.

She had been completely deaf for two years, but for several years she had been treated for deafness. Since September she had had vertigo. At that time she was attacked one morning while walking with a violent vertigo, faintness and loss of consciousness; since then she has only once had vertigo with loss of consciousness. Sometimes she has vertigo twice a day, especially of mornings, on rising, and when she stoops. There is first tinnitus, then vertigo with nausea and faintness either before or after, without loss of consciousness.

When we saw her, December 7, 1903, the vertigo was somewhat lessened under the influence of potassium iodid. which was prescribed by her physician.

The hearing tests indicated a double lesion of the middle ear, with mobility of the malleus, but total impermeability of the Eustachian tube to insufflation. The introduction of the bougie is possible on both sides, but even after bougieing the air does not always pass.

She entered the hospital May 8, 1904. She has tinnitus, but (as at her previous visit) she declares that it is intermittent, ceasing sometimes only to reappear within eight hours; it has a preference for coming on after eating or in the night, or of mornings on waking.

The vertigo has diminished somewhat since the last examination. It occurs particularly of mornings, never while at rest, but during movements, when she suddenly raises her head. At night if she lies upon her left side or her back the vertigo appears, everything swims and she seems to lose consciousness. If during sleep she unknowingly turns upon her left side the vertigo appears and awakens her.

If she is made to turn her head quickly the vertigo comes on, with palpitation of the heart and nausea. No Romberg sign.

Never ill, she says; she suffers some with her stomach, however, and the heavy feeling in her stomach, which coincides with the vertigo, she attributes to the medicines which she has taken.

She has well-defined vaso-motor trouble; at the least emotion or if she does not comprehend a question her face becomes very red at once. Never had syphilis; no children and no miscarriages.

Father died at 39 as the result of exposure; mother died at 45. Neither was deaf nor were her two healthy sisters.

The heart shows nothing abnormal on auscultation. The pulse rate is 80, somewhat tense. The other viscera show nothing abnormal. No sensory troubles nor of the reflexes. Urine normal.

The tympani on both sides are slightly retracted, rather dull and thinned. The mallei are mobile. Normal sensi-

	Right Ear.		Left Ear.	
	Before Politzer	After Politzer.	Before Politzer	After Politzer
Watch, air	.01	No modification.	0	No modification.
Watch, bone	0		0, even on contact	
Voice	.02		Barely, even on contact	
Whisper	0		0	
Fork, air	12″		12″	
Fork, bone	30″ 35″		25″ 27″	
Weber	?			
Gelle	No change		No change	
Paracusis	Positive		Positive	

tiveness of the canal and membrane. Absolute impermeability of the tube.

May, 1904. Lumbar puncture; 12 cubic centimeters of clear liquid under pressure. The immediate result is a headache, lasting until evening. During the next few days she feels a little easier; she can recline upon her back without having vertigo. The tinnitus, when it occurs is much less intense.

May 17. Another puncture; 13 cubic centimeters. Next day and the day after, she lies upon her left side without vertigo appearing. May 22, at 2 a. m., while lying upon her left side she suddenly awakened; "at first she thought she was hungry, then it seemed as if the ceiling were about to fall on her." Nauseated, she was obliged to sit up in bed, her face very pale. Since then she has had no vertigo and feels much better.

She went out May 23.

The hearing tests show no great change, as the subjoined table indicates:

	Right Ear.		Left Ear.	
	Before Politzer.	After Politzer	Before Politzer	After Politzer.
Watch air	.01		Barely on contact	
Whisper	Heard slightly (?)		0	
Voice	.02		Heard (?)	
Fork, air	12″		12″	
Fork, bone	30″ 35″		25″ 27″	
Weber			Positive	
Gelle	No change		No change	
Paracusis	Positive		Positive	

Summing up, there appears to be an improvement of the tinnitus and vertigo (although she had violent vertigo the day before leaving). She says, also, that she hears better, but the hearing tests have not changed and the words which we use in testing not being varied, her apparent improvement in hearing is perhaps due to guessing the whispered words which have already been spoken aloud to her.

We saw her again June 15. She had not had any vertigo. The tinnitus was less. Same hearing tests.

Seen again July 29, 1904. The tinnitus is more severe than before puncture. The deafness, according to her companions, has increased. The vertigo has remained less fre-

quent. However, she again had, about July 13, a violent vertigo at night, similar to the one she had before leaving the hospital.

Case IV. Old luetic. Stigmata of Hysteria. Vertigo. Deafness. Unilateral Tinnitus. Improvement of the Vertigo. Increase of the Tinnitus.

Mme. G——, forty-eight years, complaining of deafness and tinnitus of the left ear with vertigo, entered the Lariboisiere July 10, 1904.

The beginning was four and a half years ago. She was then taken with great vertigo, lasting two hours, falling, but no loss of consciousness, and which seemed to be accompanied by troubles of a different nature, for, at the moment, she understood what was said to her, but was unable to reply. At this time the tinnitus did not exist.

Six months afterward she at times was very fatigued and again had attacks of vertigo with palpitation of the heart; she did not fall, but had to support herself by something while walking.

From May to August, 1900, she had vertigo every day with noises in the left ear at the time which seemed less acute of hearing as if it were stuffed up.

At this time she was treated at Lariboisiere where she was given cachets of zinc valerianate and some pills which she was only to use during a severe attack of vertigo, and of which not more than three were to be taken. She only had occasion to use a single pill. Immediately after taking it the tinnitus suddenly disappeared, "it seemed to her as if everything suddenly became silent."

But the tinnitus soon reappeared and remained continual: the vertigo intermitted every month, every six weeks, sometimes every two months. This vertiginous state was interrupted by severe vertigo with falling and pronounced palpitation of the heart. In January, February and August, 1904, the severe vertigo recurred as often as three times a month, accompanied by repeated hiccoughs and, on the following day, for three or four hours, by a sensation of a lump in the throat.

Since then she has almost continually had little spells of vertigo four or five times a month.

The noises she feels are of two sorts:

1. The noise of a saw sawing stone, very rapid, not synchronous with the pulse.

2. The noise of water falling.

Patient is pale, cachectic.

Six years ago she had specific symptoms, diagnosticated and treated at Saint Louis.

The left tympan seems normal in color and tension; the malleus is immobile with the Siegel. Tube permeable. Sensitiveness of the membrana and external canal greatly diminished.

On the right no apparent lesions of the membrane; malleus entirly mobile; no sensory trouble of the membrana or canal. Tube permeable.

Movements of the head to right or left cause vertigo.

The pharyngeal reflex barely exists. The patellar reflex is normal. No narrowing of the visual field.

Examination of the viscera and the urine shows nothing abnormal.

With the specific history, she was submitted to treatment. Three injections of calomel were made without success.

July 12, 1904. Lumbar puncture (15 cubic centimeters); the liquid escaped drop by drop, very slowly. She appeared to get immediate relief, for as soon as the puncture was finished, she answered, in reply to a question, that she could turn her head to right or left without fear of oscillation.

July 13. Slight vertigo; it seems to her as if the bed moves.

July 15. The vertigo no longer exists. She says that her head is lighter, but the saw noises are more intense than ever.

July 19. Vertigo has returned but is less severe than before puncture. But the saw noises are much worse than before puncture, and she complains of a continual occipital headache, which she did not have before, except during the spells of vertigo.

July 21. Has no more vertigo, but the tinnitus is continually severe.

July 24. Has had another vertigo, passing off quickly. Another puncture (15 cubic centimeters). The tinnitus does not diminish.

Vertigo provoked by compression in canals—Right negative; left positive.

Tubes. Permeable.

Mallei. Movable on right.

Pupillary inequality. Right pupil much dilated.

	Right Ear.		Left Ear.	
	Before Politzer.	After Politzer.	Before Politzer.	After Politzer.
Watch, air	4 meters		Contact	
Watch, bone	Heard		Heard in right	
Voice	Normal		.50	
Whisper	3 meters		0	0
Fork, air	23″	45″	12″	0
Fork, bone	19″	25″	17″	A little, distinctly
Weber	Indifferent	Gone on right	Indifferent	
Rinne	Negative		Negative	Negative
Gelle	Positive (?)	Negative (?)	Positive (?)	Negative (?)
Paracusis	0		Hears a sound	
Galton	Heard		Heard	Heard distinctly

Examined in the ophthalmic clinic there were found the specific lesions of choroiditis, with pupillary inequality and paralysis of accommodation.

At the first examination there was found a left hemi hyperesthesia which was not found at the examination some days later.

July 26. Still no improvement in the tinnitus which tends rather to increase.

July 29. No improvement in vertigo or deafness. She can bend her head without inducing vertigo, but this has "a tendency to reappear."

Case V. Otitis sicca. Immobile ossicles. Deafness and tinnitus. Labyrinth insufficiency, slight improvement of the tinnitus.

M. P——, carriage driver, forty-three years of age, came to Lariboisiere for deafness and intolerable tinnitus, May 9, 1904.

The affection began in November previous. Following a cold he noticed that his left hearing was impaired. He was examined in a clinic where, after an insufflation of air into the Eustachian tube, he was immediately attacked with hissing in the ear and a slight vertigo, which disappeared almost immediately. Since then he hears badly with his left ear and the hissing persists. He does not seem concerned about his right ear, in which the hearing is, nevertheless, not very acute.

The tinnitus is of two kinds:

1. Hissing, like jets of steam, synchronous with the pulse (right ear only).

2. A diffuse humming through the entire head.

He is a strong man, full blooded, red faced. No syphilis. No apparent lesions of the viscera. Nothing in the urine. No alcoholism.

He complains mainly of the tinnitus, also of the deafness, which keeps increasing.

The deafness is less pronounced amidst noise and in the street than in his room.

	Right Ear.		Left Ear.	
	Before Politzer.	After Politzer	Before Politzer.	After Politzer
Watch, air	Contact		0, even contact	
Watch, bone	Slight		Nil	
Whisper	Contact		0	
Fork, bone	10″		15″	
Rinne	Negative	Negative	Negative	Negative
Weber			Left	
Paracusis	Positive		Positive	

Membrana. Immobile on right.

Tubes. Permeable.

Nose. Pharynx. Nothing of note.

May 13, 1904. Drew off 15 cubic centimeters of cephalorhachidian fluid which came out under great pressure. He complained at once of headache, but during the following day he was much relieved. The humming in the head almost completely disappeared; the hissing persisted.

May 20. Redoubled tinnitus which has never been so severe.

May 22 and 24. Two punctures made. The patient feels much relieved; the tinnitus is greatly diminished, at times disappearing completely. The humming is much less. Often of mornings the tinnitus is gone but returns during the day.

He went out May 25. At this time the watch is heard on the right at 2 centimeters, on the left at contact, the Schwabach is 13 seconds, right and left.

June 20 we again saw him. Conversation is always difficult; humming and hissing have reappeared, "maybe a little less strong."

Case VI. Otitis sicca. Immobility of the malleus. Deafness without vertigo or tinnitus. Lumbar puncture. Objective improvement.

Mme. Hey, forty years, came to the Lariboisiere for bilateral deafness.

On the right she had not heard since the age of ten years; at that time she had terrible pains in the ear which ceased after one day without suppuration.

A year ago the left ear was attacked. At the beginning she had blowing noises for eight days; then the tinnitus ceased but the deafness has increased.

She was treated by insufflation at the Sourd-Muets for six weeks without result.

Nose and pharynx healthy.

Examination of the urine—nothing abnormal.

On the right the drum is almost normal, not retracted, but the malleus is scarcely mobile.

On the left the membrane has sclerotic streaks: the handle of the hammer, slightly retracted, is rather immobile.

March 3. 1904. Lumbar puncture: 20 cubic centimeters of cerebro-spinal fluid. No immediate change, but a half-hour afterward, severe frontal headache. She does not dare sit up in bed for she then feels a little vertigo until she lies down and stretches out perfectly still, without turning her head to right or left.

	Right Ear.		Left Ear.	
	Before Politzer	After Politzer	Before Politzer	After Politzer
Watch, air	0	0	0	0
Watch, bone	0	0	0	0
Voice	Contact		Contact	0
Whisper	0	0	0	
Fork, air	0	Perceived	0	Perceived
Fork, bone	25"	25" 27"	25"	25" 27"
Weber	?	?	?	?
Paracusis		0	0	0

Siegel. Hammer little mobile on right.

Tube. Right permeable.

March 6, the condition was as follows.

Right ear: Fork, air, moderately struck, 7" 8"; fork, bone, 25"; watch, air, 1 centimeter; voice, 35 to 40 centimeters; whisper, not changed.

It appears, then, that there is a slight improvement, but the patient does not find it so, and on the 12th went home. The vertigo has disappeared, but the headache persists.

Case VII. Deafness. Vertigo. Tinnitus. Lumbar puncture. No improvement.

Coud ——, 26 years, agriculturist, came to Lariboisiere July 15, 1904, for deafness, vertigo and tinnitus.

He lost his mother when he was five and his father when eleven.

The deafness is bilateral, total on the right. On the left less marked but pronounced.

The right deafness dates back ten years; it came on slowly and progressively.

In the month of October, 1903, he became suddenly deaf in the left ear; then, two or three days later and also suddenly, he had two attacks of vertigo which caused him to fall under his plough. He saw objects whirling about in a horizontal plane and he was swept along with them, but he did not lose consciousness. These phenomena were accompanied with intense tinnitus in the left ear. At the same time the right ear, which had been exempt before, began to have severe tinnitus, which has since continued.

Since that time the vertigo comes on twice daily, causing him to fall.

The tinnitus consists of a humming on the left, a hissing on the right. They are worst during the vertigo.

Examination shows the right drum to be somewhat opaque; the malleus is completely immobile with the Siegel. Normal sensitiveness of the membrane and canal.

The left drum has a normal appearance. The hammer is slightly retracted and not very mobile.

	Right Ear.		Left Ear.	
	Before Politzer	After Politzer	Before Politzer.	After Politzer.
Watch, air	1 cent.	1 cent.	5 cent.	5 cent
Watch, bone	Positive		Positive	
Voice	Scarcely, 0.25	Slight improvement	2 m. for words, 3 for conversation.	2m for words, 3 for conversation.
Whisper	0.15 m	0 15m	0.40 for words	0.40 for words
Fork, air	0; if hit hard 5"		20"	
Fork, bone	20" average	24" 25"	27"	24" 25"
Weber	Indifferent		Indifferent	
Paracusis	0		Positive	

Siegle. Malleus immobile on right.

Tubes. Permeable.

Sudden rotary movements of the head do not provoke vertigo.

Romberg's sign; oscillates especially forward and backward but also from right to left.

Patellar reflex gone.

No Argyle-Robertson sign.

No anosmia.

Examination of the viscera shows nothing abnormal. Urine contains neither sugar nor albumin.

Patient remained at the Pitie, in the service of Dr. Babinski from May to July. Three lumbar punctures were done upon him without success.

After the first puncture he had a little relief, but since then vertigo and tinnitus have recurred with the same severity.

* * * *

Looking over our cases, we may consider the results from the triple point of view of deafness, tinnitus and vertigo.

I. As far as deafness is concerned we may enunciate the following:

(a.) We have never had improvement in hearing for conversation.

(b.) Sometimes we have had slight improvement for hearing of words, spoken or whispered.

(c.) Sometimes, also, an increased duration of air or bone perception of the fork.

But these observations while interesting to record, have no interest from the therapeutic point of view with which we are concerned. What the patient wants is not to hear the sound of a fork better, but conversation. Moreover, these notations may not be absolute, for the perception of the fork vibrating upon the cranium varies considerably, according to whether it is applied to the antral region, the mastoid tip or the temporal region. Are we sure, in the course of repeated examinations with an interval between, to apply the stem of the fork to the same spot? It would be excellent to have an unvarying acoumetric apparatus, making it possible to measure and compare different auditive values.

II. As for tinnitus, we have one lasting improvement, two transitory, one statu quo, and one increase (case III).

III. Vertigo seems to be more affected than the other two symptoms.

In five cases of vertigo, we note three marked improve-

ments (cases I, III, IV), and two failures (cases II and VII).

The improvement is clear in the sense that the patients say that they are relieved (they are the sole judges), and we have noted two objective ameliorations (cases III and IV), because in one of these, dorsal and left lateral decubitus, impossible before puncture, and, in the other, rotatory movements of the head, became easy without provoking vertigo.

In all these fortunate cases as well as those in which tinnitus was relieved, our patients claimed to have a sensation of light headedness, "as if the head were off."

But we have had no absolute cures. On the eve of her departure, case III, which was much relieved, again had a terrible vertigo in the night.

To sum up:—In the cases of otitis which we have treated, aside from amelioration of the vertiginous symptoms, within the limits and proportions just stated, the other annoying symptoms have been rebellious.

There does not appear to exist any relation between the improvement obtained and the tension of the cerebro-spinal fluid at the moment of puncture.

The patients who have been most improved (cases I and III), showed very pronounced vaso-motor troubles in the head region, and it may be asked if general treatment might not produce the same effect in these patients as rachicentesis.

We may add, finally, that in case VI, the headache following puncture has not disappeared two months and a half after the operation.

XIII.

THE APPEARANCE OF THE FUNDUS OCULI IN DISEASES OF THE EAR.

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In 1881, Zaufal[2] said the following in regard to the connection between the fundus oculi and diseases of the ear:

"In determining the indications for trepanation of the mastoid process, the ophthalmoscopic findings are absolutely necessary. An extension of the inflammation from the middle ear into the cranial cavity may be revealed at a time when distinct violent subjective or other symptoms are not yet present. The influence of trepanation on the cranial condition can be most plainly observed in the subsidence of the papillary and retinal changes. In the clinic at Prague, changes were invariably found in the fundus oculi in every case where an intracranial complication followed a disease of the middle ear."

Twenty years later, Hansen[3], in Schwartze's clinic, came to the following conclusions, at the end of his extensive investigations as to the appearance of the fundus in otitic intracranial diseases.

"Whenever changes in the fundi of the eyes appear in the course of an acute or chronic suppuration of the ear, it indicates the presence of an intracranial complication; for that papillary changes can be caused by a middle ear suppuration alone, without an intracranial affection must be regarded as an improbable and unproved assumption. If papillary changes, no matter whether mild or severe, have been observed during aural suppuration, it is an indication for immediate opening of the mastoid, however doubtful the other indications have been."

I have used the material in the ear clinic of the Royal Charite in Berlin in studying the same problem. The period has extended from December, 1893, to the present, i. e., more than ten years. Before I pass to my subject proper and the analysis of my findings in those patients in whom an otitic affection of the brain, membranes or vessels was found either during operation or post-mortem, I will discuss the question whether or not changes on the fundus can occur as sequelae of simple middle ear or mastoid diseases without a complicating intracranial affection. The literature on the subject is very scanty.

Jansen[4] in his work on "Sinusthormbose nach Mittelohreiterungen" reports 15 cases of changes in the fundus in uncomplicated diseases of the middle ear or mastoid, most of which are not free from objections. He says about as follows: "Choked dise or neuritis optica seems, in very rare cases, to be present in uncomplicated empyema of the mastoid or otitis media."

In regard to the cases cited by him, he says that he cannot avoid the belief that these cases were due to a sinus thrombosis with or without a serous arachnoiditis.

During a criticism of Barker's explanation, that a papillitis during a simple otitis media suppurativa was caused by the extension of the inflammation to the lymph vessels from the region of the optic nerve, which run in the carotid canal, Koerner[5] also seems to accept the presence of changes on the fundus in spite of lack of intracranial disease.

I take the following opinion of Bezold from the recent book of Eversbusch[2]: "The Diseases of the Eyes, in Relation to Diseases of the Nose, Accessory Sinuses and Ear," (page 119). In 100 cases of otitis media acuta or empyema of the mastoid which needed operation, changes in the fundus were found 23 times, of which 10 cases were uncomplicated empyema. In the same place (p. 121), is a communication of Schubert, who observed a simple capillary and venous injection of the papilla without retinal changes, which was frequently transitory, in cases of acute suppurations of the middle ear which healed spontaneously.

In glancing over my cases, I found the following:

Case I. Hans W., fourteen and one-half years old, from July 28, 1902, to January 7, 1903.

Patient had measles and scarlet fever at age of 3 years, without involvement of the ear. In June, 1902, a discharge of pus was observed from the left ear, without previous dis-

ease; July 7, paracentesis, left side; policlinic treatment; as the discharge did not cease, patient was sent to the hospital for operation.

Findings on entrance, July 28.

Slender, fairly well-nourished youth with stigmata of rickets; healthy internal organs; temperature 36.7°; pulse 102. Pupils of same width, reacting promptly; Romberg negative, normal functionating cranial nerves; absolutely no cerebral symptoms. No tenderness on striking the scalp or mastoids. Slight tenderness to pressure on the left tragus. Ear findings—left external meatus very narrow, filled with a greenish yellow, fetid pus; after removal of this, granulations hanging from above and anteriorly; white masses in the free space; right ear normal except for slight cloudiness of the drum.

July 31. Removal of granulations from left ear.

Aug. 14. Temperature 38.7°; edema of left mastoid, apex sensitive, superior wall of meatus bulging. Ophthalmoscopic findings—Slight venostasis in the left fundus.

Aug. 15. Normal temperature; persistence of local symptoms.

Aug. 16. Radical operation left side; bone sclerotic; in antrum and middle ear cholesteatomatous masses, partially purulent. Anvil carious, hammer imbedded in granulations; 2 centimeters of sinus wall laid bare; found soft, yielding, unaltered. Evacuation of diseased tissue, plastic, bandage.

Aug. 21. Dressed, course normal.

Sept. 3. A perichondritis of the auricle was caused by a pyocyaneus infection which kept him at the hospital until January 7. There never was any cerebral symptom; unfortunately, I found nothing further ophthalmoscopically.

We find, then, during the second month of a chronic suppuration of the left middle ear and mastoid cells, a slight change in the fundus of the eye on the same side as the diseased ear, a change which was limited to venous alterations. Neither the clinical course nor findings, during the operation allow the assumption of an intracranial, pathologic process.

Case II. Max N., 27 years old; printer.

Patient for 20 years has been very deaf on both sides, following measles; there is a foul, occasionally bloody, discharge from both ears.

Findings at entrance—Strong young man; internal organs

healthy. No tenderness on striking the scalp or mastoid. Examination of nerves and brain showed that they functionated normally. Aural findings—Bilateraly, somewhat stenosed meati, extensive destruction of drums, and evidences of a long existing suppuration of the middle ear.

Ophthalmoscopic findings—Left: Borders of disc indistinct, especially toward the nose. Right: On the nasal side hyperemia of disc, with indistinct borders.

March 14. As the secretion from the left ear had diminished, and the patient showed no untoward symptoms, he was discharged with the injunction to drop resorcin into the ears.

Case III. Bernhard A., 9 years old; July 20 to Oct. 20, 1903.

Since childhood chronic suppuration of right ear, with acute exacerbation for 14 days, accompanied by intense earaches and swelling of the postauricular region.

Findings on entrance, July 20:

The delicate boy gave a bad impression. Temperature 38°; pulse 150, regular; internal organs healthy, except for the changes caused by the fever (tachycardia, etc.). Scalp not sensitive to percussion; movement of head free in all directions; pupils equal, react; ocular movements free, no nystagmus, no Romberg, no Kernig, no cerebral symptoms.

Aural findings—Right auricle stands off from the head like a wing; behind it a diffuse, soft swelling. In the right meatus, purulent, fetid secretion, posterior meatal wall protruding; left drum retracted and cloudy.

Ophthalmoscopic findings—Left: Borders disc indistinct, sharply defined below and outwards. Right: Borders of disc indistinct, intense hyperemia of fundus.

July 21. Operation on right side; opening of subperiosteal abscess, and bone. Bone sclerotic; in the antrum, aditus and recessus epitympanicus purulent, fetid cholesteatomatous masses; middle ear filled with granulations; hammer and anvil carious, stapes imbedded in granulations. In the lateral semicircular canal, a fistula about one-half centimeter long filled with granulations; stapes removed from oval window; granulations curetted out of the niche, and the latter enlarged; vestibule free from pus and granulations; dura of the middle cranial fossa laid bare, unaltered.

July 22. Ophthalmoscopic findings (v. Haselberg)—Right: Neuritis optica. Left: Beginning neutritis optica.

The wound took the normal course; Sept. 5, moderate nystagmus observed. Oct. 20, discharged, improved.

Case IV. Mrs. H., from March 24, to April 7, 1903.

Two days before admission, had earache and feeling of both ears being stopped up, following influenza; after paracentesis, considerable discharge. March 25, the examination showed acutely inflamed drums; all other findings normal.

Ophthalmic findings—Left: Borders of disc indistinct. Right: Border of disc indistinct nasally.

April 2. Inflammatory symptoms on both sides receded. April 7, discharged after 2 weeks' treatment.

Case V. Ida G., 31 years old, from Aug. 11, to Sept. 17, 1903.

About the middle of July, 1903, patient had, as she says, a left-sided pleuro-pneumonia, in the course of which there appeared, Aug. 1, an acute inflammation of the right middle ear; purulent discharge from right ear and pain on pressure on right mastoid. Admitted Aug. 11. Well built woman, with appearance of suffering; over the left lower lobe, some shortening of sound; on inspiration, bronchitic rales, some cough accompanied by stitch in left side. Pupils equal, reacting promptly, slight nystagmus towards both sides, no cerebral symptoms, no sensitiveness to percussion of the scalp.

Aural findings—Soft parts behind the ear moderately infiltrated. Mastoid sensitive to pressure; in right meatus, sanguinopurulent, non-fetid secretion. Drum reddened, protruding postero-superiorly; pulsating light reflex below; left ear normal.

Ophthalmic findings—Bilateral hyperemia of fundi.

Aug. 12. Mastoidectomy; cells filled with bloody granulations, little pus; antrum contains small amount thick pus; dura of posterior cranial fossa laid bare, normal; slight caries of bone. Normal healing of wound, and good condition of patient until her discharge, Sept. 17.

Out of the vast number of uncomplicated suppurations of the middle ear and mastoid, coming from a material spread out over ten years, (if one neglects the few cases without ophthalmoscopic findings) I could find only five cases with changes on the fundus oculi. This occurred twice in acute disease of the ear. In case IV, there was an acute suppuration of both middle ears which rapidly got

well. In case V, there was an acute suppuration of the right middle ear with involvment of the mastoid.

In the first case the fundal changes were limited to an indistinctness of the borders of the discs on both sides, on the right side only at one place; in the second case they were limited to hyperemia of the disc and retina. In the three other cases, there was a chronic middle ear process, twice accompanied by mastoid involvement. The ophthalmoscopic examination gave in case I changes in the veins of the same side as the diseased ear; in case II, hyperemia and partial indistinctness of the borders of both discs; in case III, the hyperemia of the disc and retina developed, after the operation, into a neuritis optica. We see everywhere changes of the mildest nature, until we come to case III, which, on account of the presence of a fistula of the semicircular canals, and the communication established thereby between the diseased focus and the cranial cavity, should strictly speaking, be excluded from this group. Cases of this kind, as well as the observations of Schubert referred to above, viz., transitory capillary and venous hyperemia in acute suppurations of the middle ear, speak for the development of fundal changes in consequence of simple diseases of the middle ear and mastoid and allow the conclusions, drawn by Hansen, Ostman, Gradenigo and Delstanche from the appearance of even the mildest ophthalmoscopic changes, to be regarded as not entirely correct. On account of the extraordinary rareness of such cases, however, the demonstration of fundal changes is always signum mali ominis and indicates surgical intervention.

I should like to call attention to a group of ear diseases in which the symptoms are especially severe, expressive of a disease within the cranial cavity. The clinical appearances seem to demand the earliest surgical interference. The puncture made for the purpose of demonstrating a brain abscess frequently yields a large amount of cerebrospinal fluid under pressure flowing out of the reticulated pia mater, or ventricles. Thereupon, the urgent symptoms usually disappear at once or slowly recede. These cases are to be regarded as a meningitis serosa caused by suppuration of the ear or temporal bone, either of a toxic nature, or a collateral edema accompanying the suppuration. I subjoin the following cases (Cases I and II have already been published in theDeutsch. med. Wochensch., No. 45, 1899, p. 736).

Case I. Auguste K., 23 years old, from Sept. 10, 1898 to May, 1899.

Following an antrotomy done in May, 1895, for an acute empyema of the left mastoid, the patient frequently suffered from attacks of headache and dizziness. Since Sept., 1898, the trouble had been so severe that the patient had to come to the clinic. Findings on admission Sept. 9, 1898—Skull sensitive to pressure, on the left side; paresthesia; diminution of sensibility and motor power of the extremities on the right side; ptosis of the left lid; Romberg, falling towards the left side; pupils react; pulse 60. Aural findings—Drum retracted on both sides.

Sept. 15. Operation on the left side. Old operation cavity dry, bone necrotic, no granulations, the dura, formerly laid bare, dry, thickened, milky colored, of normal aspect when laid bare to a greater area. Puncture and incision of the dura over the temporal lobe; on incising the dura, a large amount of serous fluid apparently under high pressure was obtained; no pus. Pulse at the end of the operation 60.

Ophthalmoscopic findings (before the operation)—Intense venous hyperemia of both retinas and discs.

After the operation, sensorium free, pulse 84, bandage drenched.

Sept. 17. Sensorium free, motor weakness of the right extremities receded, ptosis disappeared, no headache, no vomiting, bandage saturated with a serous fluid.

Sept. 29. Ophthalmoscopic findings—Both sides normal, no hyperemia, pulse 70.

The healing of the wound was completed in April, 1899; in May, 1899, the patient was discharged, although all the nervous symptoms had not disappeared; the patient cannot walk alone; becomes dizzy and falls towards the left side; the sensibility of the right side, decreased; sensorium free, fundi normal.

Mueller who published the case, considered the cause of the urgent cerebral symptoms to be a meningitis serosa, which is confirmed by their prompt disappearance after the operation, and the abnormally large discharge of the cerebrospinal fluid. The hemiparesis he explains by a partially acute encephalitis serosa sinistra. As to the fundi, when the patient was admitted a considerable hyperemia of the disc and retina was found, which became less after the operation, to disappear two weeks later and remain normal.

Case II. Mrs. G., 31 years old, from November 21, 1898, to March 15, 1899.

Since 12 years of age, suppuration of the ear, following diphtheria. About the end of October, 1898, headache, dizziness and vomiting appeared several times a day; was admitted to the hospital November 21, and sent to the ear clinic on account of the suppuration of the left ear.

Findings on admission November 28, 1898—Complains of great weakness, headaches, dizziness, vomiting, trouble with thinking. Walk uncertain; Romberg, sways; sensorium not entirely free. No paralysis, aphasic or ataxic disturbances. Temperature normal, pulse 66, pupils wide, do not react, the left temporal region sensitive to percussion.

Aural findings—right drum shows cicatrix; fetid pus in left meatus, drum reddened, perforation over the processus brevis.

Ophthalmoscopic findings—Right: Disc pale red, edematous, arteries not visible; veins extremely dilated. Left: Same findings, but not so intense; no hemorrhage (Brecht).

Dec. 3. (5 days later.) Radical operation on left side, and opening of left temporal lobe. Cholesteatoma in antrum, recessus epitympanicus; dura not pulsating, protrudes considerably. Incision into the brain, and dilation with the forceps gave no pus.

Dec. 6. Pulse 66, dizziness; bilateral pronounced choked disc. Incision into the cerebellum gave no pus; no improvement immediately after the operation.

Dec. 11. Choked disc increased (6-7 D.)

Dec. 16. Choked disc still further increased (9 D.)

End of December, condition worse, unconsciousness; vomiting, evening temperature 38°. Prolapse of temporal lobe and cerebellum.

Jan. 2. Both choked discs receded.

Jan. 13. Bandage saturated with serous fluid.

Jan. 16. Ophthalmoscopic findings—Swelling of discs slight, borders very indistinct; veins full and tortuous.

Jan. 18. Condition good.

March 14. Ophthalmoscopic findings—Both discs still red, borders indistinct (Brecht).

March 18. Discharged. Patient feels nothing abnormal.

Case III. Arnold F., 20 years old, from May 22, to June 13, 1903.

The right mastoid of patient was opened (Jan. 6, 1903) on account of a mastoiditis dextra, which followed a bilateral

otitis. It is said that on Jan. 24, there were symptoms of meningitis, which quickly disappeared. May 22, the following were found—Strong, somewhat pale, young man, with healthy internal organs, with no cranial nor nervous affections. Temperature 37°, pulse 76; Aural findings—Right meatus somewhat stenosed; drum cloudy; behind the auricle, in the region of the operation-scar is a fistula, from which considerable pus is discharged.

Ophthalmoscopic findings—Left: Borders of disc indistinct.

May 22. Operation. The granulations were removed from the left operation-wound, the sinus laid bare, its walls covered with granulations and somewhat thickened. Neighboring granulation tissue contains pus; dura of middle cranial fossa normal.

May 23. Patient feels fine after operation.

May 25. Ophthalmoscopic findings—Borders left disc indistinct (v. Haselberg). Nystagmus towards left side; general condition good.

May 26. Left pupil reacts slower than right; pulse 61.

Lumbar puncture gives clear liquor cerebrospinalis, discharged under increased pressure, which contains no bacteria nor leucocytes.

May 27. Repeated vomiting; pulse 58; pupils equal, reacts promptly; complains of frontal headache.

May 28. Ophthalmoscopic findings—Right: Nothing abnormal. Left: Plain neuritis optica (v. Haselberg); pulse 60; no sensitiveness to percussion of scalp; movements of head free in all directions.

May 29. Pulse between 45 and 50; no vomiting, no dizziness, consciousness clear, no nervous disturbances.

June 7. Ophthalmoscopic findings—Left: Medial border of disc indistinct; temporal healthy.

June 13. Right middle ear dry; patient discharged in complete health.

Ophthalmoscopic findings—Borders of left pupil still indistinct, sharper towards the temporal side.

Case IV. Hermann K., 20 years old, April 11 to June 6, 1900.

Suppuration of right ear since childhood; for 8 days pain behind right auricle, severe headache. On admission, April 12, there was a swelling of the region over the right mastoid, with sensitiveness on pressure: from the right meatus comes fetid pus, but the meatus is so stenosed that it is impossible

to see deep into it. Pupils same size, react promptly; no special nervous disturbances.

Ophthalmoscopic findings—Bilateral incipient choked disc.

April 14. Radical operation right side; cells of the mastoid, antrum, middle ear, and a part of the bony meatus occupied by cholesteatoma; bone slightly carious. Punctures of the cerebellum yielded a serous fluid.

April 15. Condition good; April 19, occipital headache.

April 20. Temperature 39.2°; bilateral choked disc.

April 21. Right pupil larger than left. April 23. Bilateral choked disc; fresh hemorrhages.

April 25. Plain difference in pupils; choked disc less on both sides.

May 9. Slight edema of discs.

June 6. Right disc indistinct on the nasal side; left disc cloudy; discharged, improved.

Case V. Herman P., 11 years old, December 13, 1901 to February 11, 1902.

Since August, 1901, purulent discharge from the right ear; November 2, dizziness, vomiting, increased temperature for 14 days, delirium. Admitted Dec. 13, 1901.

Delicate boy with prominent tubera parietalia as a sign of previous rickets; internal organs healthy. Temperature normal, pulse 96, left pupil smaller than the right.

Aural findings—Left drum cloudy; right, sinking of the posterior meatal wall, the depth not plainly seen.

Ophthalmoscopic findings—Bilateral, plain neuritis optica, borders of disc indistinct, veins tortuous.

Dec. 19. Operation; at the site of the spina suprameatum is a yellowish white tumor of the size of a hazel nut, cholesteatoma which has broken through the mastoid; antrum, recessus epitrynpanicus filled with cholesteatoma; sinus lies free at one place, tegmen intact.

Dec. 20. Temperature normal, pulse 96, feels good.

Dec. 21. Borders of both discs much sharper.

Dec. 24. Hyperemia of right disc, left normal.

Dec. 27. Both fundi normal.

Jan. 4. Slight hyperemia of both discs (v. Haselberg). Temperature normal, pulse 96.

Jan. 8. Discs not distinguishable from red fundi, not prominent. Condition good.

Jan. 29. As the hyperemia of the discs did not disappear,

lumbar puncture; diminished pressure, culture sterile, no tubercle bacilli.

Jan. 30 and 31. Nausea, irregular pulse. Feb. 3. Complains of dull feeling in the head, pulse 68.

Feb. 10. Fundi almost normal (v. Haselberg).

Feb. 11. Discharged. On Sept. 30, 1902, was again admitted for the purpose of closing the retroauricular opening, and was normal in every respect.

Case VI. Herman E., 56 years old, May 19, to July 3, 1896.

For several years, patient has suffered with an affection of both middle ears; he came to the clinic complaining of deafness, pain in the left ear and occiput, dull feeling in his head. Findings on May 19 showed a normal condition of all organs, pulse 72; aural examination showed cicatricial changes in both middle ears, a slight, purulent secretion in left ear.

May 23. Headaches, frequent vomitings, temperature 37, pulse 80; patient peculiarly sleepy.

May 26. Vomiting early in the morning; intellect clear.

May 28. Left pupil reacts slowly; right dilated, does not react to light.

Ophthalmoscopic Findings—Left: Slight prominence of disc; borders somewhat indistinct; veins more tortuous than normal. Right: Borders of the disc covered; veins tortuous; no hemorrhage; neuritis optica.

May 29. Temperature 37; headache.

June 4. Patient occasionally complains of double vision; local treatment of the ear.

June 15. Ophthalmoscopic Findings—Left: No difference in the refraction between the disc and retina; the lower veins still somewhat tortuous, otherwise normal.

July 3. Discharged.

Case VII. Emil H., 14 years old; was admitted October 30, 1903, with a bilateral otitis media acuta; after repeated paracenteses of the drums, a large flow of pus was obtained from both ears; this soon diminished, so that the patient could be discharged November 20th. In a few days there appeared an occasional slight rise of the temperature and pain in the right mastoid. During this period the patient showed symptoms of dizziness, some nystagmus on movements of the eyes toward the right, headache, very pronounced Romberg's symptom. The mastoidectomy, made December 4th, gave only hyperemia of the bones, a

somewhat mucous secretion in the antrum, no granulations; on puncturing the dura of the posterior cranial fossa, there was obtained a large amount of clear liquor cerebro-spinalis, under high pressure; the bandage later was saturated with a serous fluid. Repeated lumbar punctures likewise yielded a clear liquor cerebro-spinalis, which was found free from germs. Repeated examinations of the eyes always showed normal fundi.

The condition gradually became better, so that the patient could be discharged.

Among the seven cases of this group, with the clinical symptoms of intracranial affection without demonstrable pathologico-anatomic changes, we found only in one case (No. VII) that the fundus was free from lesions. In the six other cases there were five times a high degree of fundal changes (neuritis optica or choked disc), once No. I) only hyperemia of the disc and retina, although very pronounced.

The changes were found in both eyes, either in the same degree or with a slight difference. Case No. 3 is noteworthy because the change was only on one side, i. e. on the side where the aural affection had been quiescent for some time, and where the mastoid was healthy, while the suppurative process affected the middle ear and mastoid of the other side. (In this case the ophthalmoscopic examination was repeatedly made by the assistant to the eye clinic, Dr. v. Haselberg, and the fundus on the side of the diseased ear was always found healthy. The control of the ophthalmoscopic findings was nearly always made by specialists, which was easy on account of the intimate connection of the clinics in the Charite.)

The development and course of the ocular lesions sometimes paralleled the other intracranial symptoms, diminished after the operation and disappeared in a few weeks as in Case I; in case II the obstruction symptoms became worse after the operation; 13 days after the operation increase was still observed, accompanied by other symptoms of cranial pressure which still persisted in spite of the operation, and recession took place after one month. In Case III the opticus lesion remained at its height six days after the operation, and was still to be seen when the patient was discharged, three weeks later. Case IV showed the same condition. Case VI entered with the cranial symptoms of neuritis optica, which receded after 15 days.

Every case where the cranial complication of the aural

affection was confirmed by the operation or autopsy is tabulated in the following:

Case 1. Anamnesis—Richard D., 34 years, February 5 to 12, 1894; chronic suppuration of the right middle ear; fever and chill just before admission.

Findings and Course—Movements of the head to the side painful; intellect not entirely free; temperature 40.5°, pulse 108, twitching of the facial muscles; on the right side, slight swelling and redness of the soft parts over the mastoid, as far down as the neck. February 9th, operation on the right side, no retention of pus in the antrum; perisin. Suppuration, sinus apparently healthy. February 11th, temperature 39.5°, unconscious. February 12th, death.

Autopsy—Purulent thrombus of the right sinus transversus, circumscribed purulent arachnitis; perisinous abscess found at the operation.

Fundus—February 9th, both sides normal.

Case 2. Anamnesis—H. S., 20 years; June 26th to September 24th; chronic suppuration of the right middle ear; 14 days before admission, headache, vomiting, dizziness.

Findings and Course—Internal organs healthy, normal temperature, pulse 60, uncertain walk, headache, dizziness on standing up; right posterior meatal wall bulging, defect in drum, pus; left ear healthy. June 29th, operation, right; granulations in mastoid, middle ear; cerebellar dura laid bare, normal color, not pulsating. July 2d, during change of bandage the cerebellar dura is seen perforated; incision, brain substance necrotic; probe touches firm substance at depth of 1½ cm., no pus. July 5th, good condition, pulse 72, gait still uncertain. August 8th, no headache, walk all right, wound almost healed. September 24th, discharged cured.

Operation—Cerebellar abscess (?) on right side.

Fundus—June 26th, bilateral choked disc. June 29th, distinct choked disc on both sides; right veins more swollen and tortuous than left. June 30th, choked disc unchanged. July 3d, choked disc recedes. July 8th, same. July 14th, borders of right disc plainer. July 27th, signs of obstruction considerably less; borders of disc distinct; veins still tortuous. August 10th, slight swelling of discs and retinas in their neighborhood, as far as the temporal borders; veins dilated. September 3d, fundi normal.

Case 3. Anamnesis—Carl K., 20 years; February 15 to March 14, 1895; chronic inflammation of right middle

ear; some days before admission, malaise, headache, vomiting, chilliness.

Findings and Course—Delicate man; temperature 38.8°, pulse 64; apathetic, slight stiffness of neck, fetid discharge from right ear. February 20th, pronounced stiffness of the neck, severe headache, hyperesthesia of the lower extremities; radical operation right side; cholesteatoma, carious destruction. February 21st, increased temperature, headache, stiff neck, pulse 46-60. February 27th, so far, relative good condition, temperature over 38°, clear intellect, twitching of facial muscles. March 7th, lumbar puncture gives fluid containing leucocytes. March 11th, temperature normal, pulse 72, relative good condition. March 14th, death.

Autopsy—Abscessus cerebelli dextri; arachnitis purulenta adhaesiva cerebellaris, pachymeningitis petrosa; hydrocephalus internus; abscess of the right half of the cerebellum size of walnut.

Fundus—February 16th, no changes. February 17th, same. February 23, borders of both discs indistinct. February 24th, bilateral beginning neuritis optica, borders indistinct, veins very full; left, changes greater. March 1, distinct neuritis optica. March 3d, neuritis optica greater. March 11th, border of right disc invisible; left indicated.

Case 4. Anamnesis—Aug. L., 25 years; August 21st to October 27th, 1894. Otit. med. dex. chron.; headaches for eight days, dizziness pain in limbs.

Findings and Course—Temperature 39.8°, pulse 88, severe headache, right mastoid painful; no nervous disturbances. August 22d, chill, right mastoid sensitive to pressure, headache, fetid pus in right meatus; defect of drum, granulations; Operation granulations and pus in mastoid cells, antrum, middle ear. August23d, temperature increased, headache. Operation; perisinous abscess, one teaspoonful fetid pus; from sinus come pus and thick blood. August 24, temperature increased, pus in sinus. August 29th, temperature normal; course normal. October 27th, sent to policlinic for treatment.

Operation—Purulent thrombosis of sinus transversus dexter; perisinous abscess right side.

Fundus—August 21st, normal.

Case 5. Anamnesis—G. S., 16 years; February 28th to March 14th, 1895. Bilat. chron. sup. m. ear, following influenza; since middle of February increase of ear affection, lately somewhat apathetic.

Findings and Course—Somewhat apathetic, passive movements of head painful, no nervous disturbances, left mastoid painful; fetid pus both ears, left post. meatal wall bulging; defects drums both sides. March 2, temperature 40°, chill, pulse 64. March 3d, operation left side; mastoid full of pus, sinus covered with granulations, apparently healthy, puncture gives fluid blood. March 5th and 6th, rise of temperature to 40°, chill. March 7th, incision of sinus yields fetid pus. March 9th, opening right mastoid, sinus and dura normal. March 11th, vomiting, pulse 68, left pupil wider than right, no reaction, left side ptosis and paralysis of abducens. March 12th, unconscious. March 14th, death. Fever typically pyemic during entire course.

Autopsy—Caries ossis petrosi utriusque; thrombosis sinus petrosi utriusque; pachymeningitis interna purulenta; encephalitis hemorrhagica cerebellaris; considerable pus between left occipital lobe and upper half of left cerebellum.

Fundus—March 1st: Left; external border disc sharp, internal indistinct; no swelling; no tortuous veins; clear retinal reflex. Right, Normal. March 12th: Left, plain choked disc. Right, less. March 13th, left, choked disc, 5-D.; right, disc swollen, borders hidden, visible only temporally.

Case 6. Anamnesis—K. B., 17 years; May 22 to June 6, 1895. Otitis med. chron. dex.; pain in right ear since middle May, chills and vomiting for two days.

Findings and Course—Strong, free sensorium; no nervous disturbances, internal organs healthy, no pressure sensitiveness of mastoid, right posterior meatal wall swollen, drum shows defect, size of pea, above, from which come epithelial masses. Temperature 39°. May 24th; operation, right side. Cholesteatoma, carious processes, lower third of sinus wall gangrenous, no pus in sinus. May 25th, slight nystagmus, movements of head painful, pus from sinus during change of dressing; ligation vena jug. May 27th, temperature 39°, chill. May 30th, chill, temperature 40°. June 6th, death; pyemic fever during entire course.

Autopsy—Thrombophlebitis petrosa et venae jugularis dextrae; arachnitis purulenta; pachymeningitis externa; base of arachnoidea cloudy, infiltrated.

Fundus—May 22d, both sides entirely normal (Prof. Burchardt).

Case 7. Anamnesis—Max B., 5 years; July 22d to July

27th; otit. med. chron. bilat.; fever and vomiting for several days.

Findings and Course—Strong boy, healthy internal organs, left mastoid painful; somnolent, very feverish, bilateral middle ear suppuration, left meatus stenosed, granular above and behind. July 24th, operation left; mastoid, antrum, middle ear full of granulations, sinus bathed in pus, not thrombosed; intellect clear after operation. July 26th, temperature between 39° and 40°; distinct stiffness of neck; pupils wide, no reaction; unconscious, convulsions, death.

Autopsy—Meningitis purulenta basil. hydrocephalus, no sinus thrombosis, perisinous abscess found at operation.

Fundus—July 22d, normal. July 26th, normal.

Case 8. H. H., 27 years; May 17th to May 19th; otit. med. chron. sup. sin.; chill several days before.

Findings and Course—Temperature 40.2°, pulse 96, unconscious, pain on movements of head and pressure on left mastoid; fetid pus left ear, pupils equal, react. May 18th, operation left side; bone sclerotic; cavities, little pus; sinus laid bare, walls necrotic, thrombus removed. May 19th, unconscious, opisthotonus, death.

Autopsy—Pur. thrombosis left side; pachymeningitis interna et arachnitis purulenta; internal face dura in region of sinus transv. covered with pus, sinus wall at one place decomposed; edema of arachnoidea, and base of brain.

Fundus—May 17th, both sides normal.

Case 9. Anamnesis—Mrs. G., 23 years; January 29 to February 15, 1896; Otit. med. chron. sup. sin.; treated in policlinic one wee kbefore admission for pain and discharge in left ear.

Findings and Course—Great malaise, slightly somnolent, fetid discharge left ear, meatus narrow, pulsating light reflex. January 31st, operation left side; cholesteatoma and purulent granulation in mastoid and middle ear. February 1st and 2d, very delerious. February 2d, abscess size pigeon's egg opened in left temporal lobe. February 6th, amnestic aphasia. February 15th, death.

Autopsy—Abscess left temporal lobe.

Fundus—January 31st, borders of both discs sharp (Prof. Burchardt).

Case 10. Anamnesis—M. B., 40 years; October 14th to 17th; Otit. med. chron. sup. dex.; headache, dizziness and uncertain gait since end of September.

Findings and Course—Not entirely conscious; right side,

slight ptosis and facial paresis; gait uncertain, Romberg's symptom present; right meatus stenosed, fetid pus. October 15th, operation right side; pus and granulation in mastoid; dura laid bare, healthy. October 24th, symptoms unchanged, temperature increased, headache; operation; laying bare and incision of temporal lobe and cerebellum; no pus; post operation temperature 39°, vomiting, somnolence. October 27th, death.

Autopsy—Purulent infiltration of pia of base; right cerebellar hemisphere shows discolored infiltration in region of sinus; right sinus trans. contains, in places, purulent thrombi.

Fundus—October 14th, normal.

Case 11. H. J., 28 years; April 14 to 24, 1896; Otit. med. chron. sup. sin.; headache on left side for some weeks.

Findings and Course—Somewhat unconscious, nystagmus, percussion sensitiveness on left half of head; pus in left ear; granulation above and behind; pulse 65; paralysis left facial. April 15th, temperature normal, pulse 58, somnolent, vomiting. April 17, operation left side; granulation in mastoid; caries of horizontal semicircular canal; operation interrupted by injury of sinus. April 19th, unconscious. April 21st, cerebellum incised, no pus. April 24th, death.

Autopsy—Left half of cerebellum adhering to temporal bone; after the dura was detached, a cerebellar abscess, size of walnut was opened; hydrocephalus internus; cerebellar abscess by involvement of equaeductus vestibuli.

Fundus—April 14th, normal; borders of disc sharp; color and appearance of vessels normal (Prof. Burchardt).

Case 12. Anamnesis—A. L., 34 years; October 6th to 27th; Otit. med. chron. sup. sin.; great discharge.

Findings and Course—Dull headache in temple and forehead, no dizziness, Romberg—slight, fetid suppuration left ear, defect in drum. October 7th, operation left side; tegmen antri et tympani carious, also labyrinth, dura healthy. October 11th, vomiting, headache, dizziness, temperature 37°, pulse 54. October 13th, pulse 52; left pupil reacts slower than right, conscious. October 19th, left pupil larger than right. October 26th, pulse 58, delirium. October 27th, ptosis left side, twitching left facial, delirium; operation laying bare and incision left temporal lobe; dura not pulsating, not colored, no pus. Death few hours after operation.

Autopsy—Pia of base infiltrated with pus; cloudy fluid in ventricles.

Fundus—October 6th, fundi pale, normal. October 13th, normal. October 22d, normal. October 26th, normal.

Case 13. Anamnesis—F. L., 47 years; February 15 to 17, 1898; Otit. med. chronic. sup. dex.; two days before, suddenly, headache and pain in neck; brought to clinic in somnolent state.

Findings and Course—Somnolent, antero-posterior movements of head limited; pupils react slowly; no nystagmus, no paralysis; temperature 39°; pulse 72; suppurating bone fistula behind right ear. February 15th, operation right side; sinus laid bare; walls much thickened, slightly bleeding on puncture; incised, no pus, stenosed in the neighborhood. February 16th, unconscious, temperature 38°, pulse 140. February 17th, death.

Autopsy—Right sinus transversus filled with purulent thrombi as far as the confluens sinuum; vena jug. free, arachnoidea of base and convexity infiltrated with pus.

Fundus—February 16th, fundi normal; borders of discs sharp.

Case 14. Anamnesis—F. S., 48 years; September 19, 1898; Otit. med. chron. sup. dex.

Findings and Course—Unconscious, pupils equal, paralysis left facial, death.

Autopsy—Dura over right tegmen antri discolored and perforated; abscess right temporal lobe.

Fundus—September 19th, normal.

Case 15. Anamnesis—H. M., 16 years; September 16 to October 6, 1898; Otit. med. chron. sup. sin.; three weeks ago aural discharge increased, headache.

Findings and Course—Apathetic, uncertain gait, headache, especially left side, dizziness, amnesic aphasia, pulse 48, much pus from left ear. September 17th, operation left side; mastoid full of granulations and pus, tegmen antri gone, dura thickened, puncture gives pus, opening of abscess of temporal lobe, from without; after operation, conscious, pulse 60. September 20th, sensorium free, aphasia still existing. October 2d, somnolent, pulse lengthened, evacuation three tablespoonfuls of pus. October 6th, death.

Autopsy—Dura of surface left pyramid adherent, brain degenerated over tegmen; abscess comprising entire left cerebral hemisphere, so that a brain mantle of only 3 cm. thickness remained; no sinus thrombosis.

Fundus—September 16th, right disc pale; left, tortuosity of veins, disc pale. September 20th, both sides normal.

Case 16. Anamnesis—M. M., 18 years; August 6 to 30, 1899; Otit. med. sup. chron. dext.

Findings and Course—Temperature, 38.7°, pulse 130, somewhat apathetic, severe headache, right mastoid sensitive to pressure, whole head to percussion; pupils equal, react; nystagmus; fetid suppuration right ear, total defect drum. August 10th, temperature 38.8°, pulse 120, right pupil larger than left; bulb, venae jug. dext. sensitive to pressure; Romberg positive; operation right side; cholesteatoma, in middle ear, recessus and antrum; puncture of cerebellar dura gives fetid pus; laying bare of cerebellum gives two tablespoonfuls of pus; after operation, temperature 37.2°. August 13th, right pupil larger than left, intense nystagmus; apathetic; dressing; much pus from cerebellar abscess; sinus partially discolored, no thrombus. August 16th, chill, vomiting; fever with typical pyemic course; varying consciousness; continual discharge of pus from cerebellum. August 30th, death.

Autopsy—In addition to abscess opened at operation there is a second one, size of cherry; right half of cerebellum adhering to region of sinus transv. and latter thrombosed.

Fundus—August 10th, right disc cloudy; borders indistinct, viens overfilled. Aug. 11th, disc has sharp borders. Aug. 21st, right disc cloudy; nasal border indistinct, viens very full.

Case 17. Anamnesis—C. B., 22 years; April 4 to May 8, 1899; Otit. med. chron. sup. dext.; since March 30th, headache, dizziness, vomiting.

Findings and Course—Temperature 39°, pulse 100, headache, very sick appearance, nystagmus toward right side; much discharge right ear, right drum bulging, with pulsating light reflex. April 5th, temperature 40.4°, chill, nystagmus toward right side. April 6th, operation right side, cholesteatoma, laying bare of sinus filled with disintegrating thrombus; after the operation, temperature 37.3°. April 17th, temperature 37°, pulse 70, condition good. April 26th, weak, headache, pulse 60, sensorium free. April 28th, opening of cerebellum from posterior cranial fossa; two tablespoonsful of pus. April 29th, pulse, temperature, normal; sensorium free. May 3d, apathetic. May 8th, unconscious, pulse 96, temperature 37°; dressing, no pus, great tension of brain; laying bare and incision of cerebellum, no pus; death same day.

Autopsy—Purulent sinus thrombosis and right cerebellar abscess.

Fundus—April 5th, normal. April 26th, entirely normal. May 6th, right disc hyperemic. May 8th, neuritis optica dex.

Case 18. Anamnesis—E. H., 15 years; August 2 to 25, 1899; Otit. med. chron. sup. dex.; in the night from August 1st to August 2d, vomiting and chill.

Findings and Course—Anemic girl, very feverish; fetid pus from right ear, posterior meatal wall sunken. August 4th, chill, malaise. August 5th, malaise, nystagmus toward left; operation right side, pus and granulations in mastoid, sinus normal; temperature after operation, 36.7°. August 7th, sinus laid bare backwards. discolored, tamponade on account of hemorrhage. August 8th, slight icterus, nystagmus, chill. August 16th, dressing, region of bulb smeary, right pupil larger than left. August 21st, unconscious, ligation ven. jugul. August 22d, dressing shows pus; facial paralysis; coma; pus from bulb. August 28th, death.

Autopsy—Arachnoidea of base and right temporal lobe infiltrated with pus; icherous thrombus right sinus transversus into the bulbus ven. jugul.; inner side of dura of posterior cranial fossa infiltrated with pus.

Fundus—August 5th, normal. August 11th, veins very full, and tortuous, borders of discs sharp. August 21st, fundi normal.

Case 19. Anamnesis—F. S., 10 years; November 12, 1898, to March 4, 1899; Otit. med. sup. acuta sin.; discharge from left ear for 14 days.

Findings and Course—Temperature 37.7°, pulse 72, somewhat stupid, uncertain gait; Romberg positive, slight nystagmus, movements of head limited, dizziness, pus in left auditory meatus, drum red and protruding. November 16th, temperature 38°; occiput painful; delirium; operation left side; evacuation of pus by puncture of cerebellum through the posterior cranial fossi; opening of cerebellum, evacuation of two tablespoonsful of pus; after operation sensorium freer. December 3d, during change of dressing, one teaspoonful of pus comes behind gauze; temperature normal. January 3d, out of bed. April 5th, discharged, cured.

Operation—Abscess left side of cerebellum.

Fundus—November 14th, border right disc indistinct, veins tortuous; left, veins tortuous. November 27th, bilateral hyperemia of fundus. December 3d, both fundi normal.

January 29th, same. July 8th, when patient returned to have wound looked at, fundi examined and found normal.

Case 20. Anamnesis—O. D., 15 years; June 13th to 27th, 1899; Otit. med. chron. sup. dex.; chill and pain on moving head, a few days before admission.

Findings and Course—Head bent towards right side, movement to left painful; total defect right drum, pus. June 18th, gait uncertain; operation on right, caries of tegmen tympani; sinus walls discolored, on opening blood and pus. June 21st, nystagmus. June 22d, slight edema of both lids. June 24th, apathetic; temperature 37.5°; slight paresis of right abducens. June 25th, unconscious; ptosis left side; both lids edematous. June 27th, death.

Autopsy—Purulent thrombosis right sinus transversus extending into right sinus cavernosus and ven. jugul.; arachnitis purulenta circumscripta.

Fundus—June 17th, bilateral neuritis optica.

Case 21. Anamnesis—E. W., 39 years; September 20, to October 2, 1899; Otit. med. chron, sup. sin.; for four days pain in left half of head, fever, unintelligible speech.

Findings and Course—Apathetic; aphasic disturbances, pressure sensitiveness on left half skull, severe headache, fetid pus in left meatus; superior posterior wall protruding; defect in drum. September 21st, operation left side, granulations and pus in mastoid and middle ear; tegmen carious, dura discolored; laying bare and incision left temporal lobe, one teaspoonful of pus. September 21st, high temperature, aphasia unchanged. September 23, twitching muscles right side of face and right extremities; unconscious. September 24th, repeated convulsions. October 2d, death.

Autopsy—Abscessus lobi occipito-temporalis.

Fundus—September 20th, considerable distension veins both sides, otherwise nothing especial. September 26th, right disc shows indistinct borders, tortuous veins.

Case 22. C. Z., 30 years; September 23d to October 14, 1899; Otit. med. chron. sup. sin.; since August, 1898, ear affection; for some weeks dizziness, vomiting, fever, very emaciated.

Findings and Course—Greatly emaciated man; tuberculosis of lungs; temperature normal; Romberg positive; tendency to fall backwards; head not sensitive to pressure, foul pus in left meatus, total defect, labyrinth wall covered with smeary masses. September 30th, paresis left facial; nystagmus toward right side; speech indistinct. October 6th,

dysphagia. October 10th paralysis of taste on left side, hypalgesia left side. October 13th, somnolent. October 14th, death.

Autopsy—Abscessus cerebelli sin., arachnitis purulent. partialis regionis ossis petrosi sin. et chiasmat. nervorum II, phthisis pulmonum, great tubercular ulceration posterior surface velum palati, caries labyrinthine wall and facial canal. Tubercle bacilli never found in aural discharge.

Fundus—September 28th, both sides normal. October 14th, normal.

Case 23. Anamnesis—W. D., 25 years; December 20th to 21st, 1899; Otit. med. chron. sup. sin.; for four weeks swelling behind left ear, for three days vomiting.

Findings and Course—Very sick appearance; apathetic; diffuse swelling behind left ear, with fistula; temperature normal, pulse 60; fetid pus from stenosed left meatus; pupil reaction slow. February 21st, operation left side, uncovering cerebellum, dura tense, not pulsating; incision, no pus.

Autopsy—Cerebellar abscess left side; pachymeningitis externa in region of left temporal bone; operation incision ½ cm. in front of abscess.

Fundus—December 20, normal.

Case 24. Anamnesis—H. M., 18 years; Dec. 30, 1898, to Jan. 3, 1899; Otit. med. chron. sup. dext.; for fourteen days profuse aural discharge, pain in head and neck.

Findings and Course—Sideward movements of head painful; vomiting; defect right drum; fetid suppuration. December 31st, operation right side; pus in mastoid, sinus bathed in pus, walls thickened, not discolored; for two days chills, rise of temperature to 40°; right pupil larger than left, not reacting. January 3d, death.

Autopsy—Purulent infiltration pia of base, pachymeningitis externa of region right temporal bone; perisinous suppuration right side.

Fundus—December 30th, right disc cloudy, borders indistinct, vessels very full; left side, same. January 2d, bilateral venous hyperemia (Brechl).

Case 25. Anamnesis—P. H., 38 years; September 20 to October 5, 1900; Otit. med. sup. acut. sin.; for four weeks, headache left side; for six days, fever, headache, malaise; three paracenteses.

Findings and Course—Looks very sick; temperature 39.2°; severe headache; region behind left mastoid sensitive to pressure; no Romberg; no nystagmus, no paralysis; pupils

equal, react. September 26th, vomiting. October 1st, headache, no suspicious symptoms. October 3d, temperature 39.6°, slightly somnolent, pulse 120. October 4th, operation left side, pus from sinus, abscess in left shoulder joint. October 5th, death.

Autopsy—Left sinus transversus to junction with sinus. longit. filled with purulent thrombus, pus in meshes of arachnoidea of medial hemisphere.

Fundus—September 23d, normal. October 1st, normal.

Case 26. Anamnesis—W. P., 19 years; November 29 to December 23, 1900; Otit. med. sup. chron. sin.; headache three weeks, nausea, vomiting, dizziness.

Findings and Course—Very sick, percussion sensitiveness of left occiput; slight swelling and sensitiveness left mastoid; fetid pus in left meatus; temperature 37.8°, pulse 90. November 30th, operation left; cholesteatoma.; pus, perisin. abscess, sinus wall yellow discolored. December 2d, chill. December 4th, purulent thromb. removed from sinus. Until December 21st, high temperature, chill. December 21st, evacuation of a perisin. abscess. December 23d, death.

Autopsy—Purulent thrombosis left sinus transversus, metastatic lung abscess; extra-dural abscess of posterior cranial fossa discovered at operation.

Fundus—November 29th, normal.

Case 27. Anamnesis—C. G., 21 years; November 10 to 29, 1900; Otit. med. chron. sup. sin.; for some days fever, much suppuration.

Findings and Course—Left auricle directed forward, swelling as far as squamous part of temporal, fetid pus in left meatus, superior posterior wall bulging. November 14th, operation left; gran.; carious destruction. November 21st to 26th, high temperature, chill. November 26th, removal purulent thrombus from left sinus transversus. Death while unconscious, November 29th.

Autopsy—Purulent thrombus of left sinus transversus.

Fundus—November 10th, normal. November 26th, normal.

Case 28. Anamnesis—E. E., 14 years; September 11 to 13, 1900. Otit. med. chron. sup. dex.; for one week, headache, dizziness, fever, chill.

Findings and Course—Apathetic, some sobbing; temperature 38.5°, pulse 80; right pupil larger than left; paresis of right rectus internus; whole head sensitive to pressure; headache. September 12th, temperature 41.3°; apathetic;

right pupil reactionless; ptosis right side, right int. rectus paralysed; operation right side; choles., tegmen carious; incision temporal lobe, 1½ tablespoonfuls pus; after operation, conscious. September 13th, death.

Autopsy—Abscess in right temp. lobe of size of walnut; pus between dura and arachnoid of whole right hemisphere. Arach. infiltrated with pus.

Fundus—September 12th, bilateral neuritis optica.

Case 29. Anamnesis—Mrs. M., 33 years; August 20 to September 18, 1900; Otit. med. acut. sin.; for three weeks, discharge left ear, for some days, vomiting, headache.

Findings and Course—Edema left mastoid, left meatus swollen, posterior superior wall bulging; purulent secretion; drum red, bulging. August 22d, operation left side, granulations and pus in mastoid and antrum, sinus not discolored. August 29th, sinus incised, purulent thrombus. September 18th, discharged, improved.

Operation Findings—Purulent thrombosis left sinus.

Fundus—August 29th, myopic fundi; discs grayish white, not swollen, sharply defined from surrounding structures.

Case 30. Anamnesis—M. S., 22 years; March 6 to June 15, 1900; Otit. med. chron. sup. sin.

Findings and Course—Pain in left half of head, dizziness, Romberg very pronounced, no nystagmus, sensorium free, temperature 37.4°, pulse 96. March 8th and 10th, convulsions (patient has epilepsy). March 29, operation left side; granulations, caries in region facial spur.; headache after operation. April 30th, May 7th and 10th, convulsions. May 14th, persistent complaint of headache left side, clear intellect. May 15th, pronounced percussion sensitiveness on left side, beginning amnesic aphasia, some stupor. May 16th, operation left side; incision in left temporal lobe, no pus. May 23d, persistent, more or less pronounced somnolence. May 25th, increased temperature, delirium, pus from temporal lobe on change of dressing. May 29th, sensorium clearer, plain amnesic aphasia. June 2d, intellect clearer, aphasia less, serous fluid from wound in brain, temperature normal, pulse 72. June 9th, facial paralysis right side, pulse 56. June 13th, another incision into left temporal lobe, one tablespoonful of pus. June 15th, death.

Autopsy—Abscess size of apple in left temporal lobe; sinus, dura, tegmen antri et tympani and labyrinth intact.

Fundus—March 6th, normal. April 23d, normal. May 15th, normal. May 23d, neuritis optica incip. May 30th,

both discs cloudy, borders indistinct, slight swelling, veins tortuous, no hemorrhages, neuritis optica.

Case 31. Anamnesis—W. M., 30 years; July 11 to 21, 1900; Otit. med. chron. sup. bilat.; headaches for eight days, unconscious since yesterday.

Findings and Course—Temperature 38.9°, pulse 116, somnolent, hyperesthesia, head movements painful; large discharge both ears; left mastoid sensitive to pressure; plain torticollis, cutaneos reflex increased. July 13th, unconscious, torticollis. July 17th, right extremities paretic; operation left side, abnormal amount of pus on opening mastoid, tegmen carious; opening of abscess temporal lobe; after operation rise of pulse from 60 to 90; since operation unconscious. Death July 21st.

Autopsy—Abscess size of apple in left temporal lobe; thrombus in left sinus transversus.

Fundus—July 14th, both discs reddened; borders indistinct; veins overfilled.

Case 32. Anamnesis—E. N., 23 years, June 16 to July 10, 1900; Otit. med. acut. sin. For 1 week, discharge left ear, headache.

Findings and Course—Fetid pus from left meatus; post. wall bulging; June 22, temperature 39.8°; chill, headache, vomiting; mastoid sensitive to pressure; June 26, operation left side; choles., gran., pus. external sinus wall destroyed; pus from sinus; June 30, sinus full of pus, at dressing. July 1, pus from bulbus v. jugul. July 10, death.

Autopsy—Pur. thrombosis of left sinus transv. from bulb to confluens sinuum, focus of pus, left side, between cerebellum and arachnoidea.

Fundus—June 24, normal.

Case 33. Anamnesis—H. B., 23 years: Jan. 21 to Apr. 4, 1900; Otit. med. chron. sup. dex.; for several days fever, chills, vomiting, dizziness.

Findings and Course—Tip of right mastoid sensitive to pressure; fetid pus right side; white masses in depth of ear; Jan. 22, chill; pain on pressure on throat on both sides; Jan. 26th, daily chills; no nystagmus; operation right side; choles., sinus incised; non-purulent thrombus removed; perisin. abscess; Jan. 31, temperature normal since operation; icterus, pleuritis sinistra; Feb. 1, pus from bulb. v. jugul.; right v. jugul. thrombosed as far as thyroid cartilage, ligated and slit; two months later wound healed, patient discharged April 4.

Operation Findings—Purulent thrombosis of sinus transv. and bulbus v. dext.; perisin. abscess right side.

Fundus—Jan. 22, normal; Jan 26, normal; Feb. 19, normal.

Case 34.—Anamnesis—W. J., 24 years; June 16 to 27, 1900; Otitis med. chron. sin.: for three weeks earache and pain in neck on movement.

Findings and Course—Fairly strong, head bent towards left; movements painful; fetid pus from left ear; defect drum; no vomiting; no dizziness; no headache; no nervous disturbances; June 19, operation left side; cavities mastoid and antrum filled with choles., gran., and pus; bare dura of m. cranial fossa unchanged; extradural pus in m. cran. fossa.; June 24, sleepy; Romberg positive; walk uncertain; nystagmus; June 25, stupor; operation left side; sinus slit to foramen jugul; pus in same; no improvement after operation; June 27, death.

Autopsy—Pia of right hemisphere and base of brain infiltrated with pus; sinus thrombosis left side; extradural abcess left side.

Fundus—June 19, normal.

Case 35. Anamnesis—P. R., 47 years; March 18 to 25, 1901; Otit. med. sup. chron. bilat.

Findings and Course—Strong; internal organs healthy; headache; both mast. somewhat sensitive to pressure; profuse discharge both sides, not fetid; no dizziness; no vomiting; temperature between 37.5° and 38°; pulse 80; March 20, operation left side; choles., tegmen carious; normal temperature until Mar. 24; no complaints; Mar. 24, temperature 40.4°; pulse 60; on change of dressing, normal dura in region of tegmen; somnolent in evening; vomiting; Mar. 25, death.

Autopsy—Abcess, size pigeon's egg in left temp. lobe; pus in left lateral ventricle and 4th ventricle; pur. infiltration of arachnoidea cerebelli; dura over left temp. bone infiltrated with pus; latter carious.

Fundus—Mar. 20, normal.

Case 36. Anamnesis—M. S., 12 years; Dec. 3, 1900 to Jan. 30, 1901; Otit. med. acut. sup. bilat.; for 3 days, swelling behind left ear.

Findings and Course—Left auricle stands out; much fetid pus both ears; gran. in depths; no headache; no nervous symptoms; internal organs healthy; Dec. 10, operation left side; choles.; tegmen perforated, dura bare; dura of post.

cranial fossa bare; Dec. 20, temperature normal; no complaints; wound looks well; pus in right ear; Jan. 16, operation right side; cavities filled with gran.; Jan. 25, rise of temperature; nystagmus; cervical pain on movement of head; Jan. 27, persistent vomiting; torticollis; headache; hyperesthesia; conscious. Lumbar puncture; cloudy, floculent fluid, containing steptococci; Jan. 30, death.

Autopsy—Arachnoidea of base infiltrated with pus, especially in region of n. optici and medulla oblong.; cloudy fluid in ventricles; no thrombi in sinus; left temp. bone discolored at junction of petrous and squamous portions.

Fundus—Jan. 16, normal.

Case 37. Anamnesis—K. G., 20 years; Feb. 1 to 3, 1901; Otit. med, sup. chronic bilat. since middle of Jan.; headache; dizziness.

Findings and Course—Apathetic; headache; some torticollis; painful head movements; fetid pus from left ear; radical operation on right side; Feb. 3, death.

Autopsy—Purulent basilar meningitis; some hydrocephalus.

Fundus—Feb. 1, bilat. overfilling of vessels; no inflammatory changes.

Case 38. Anamnesis—A. J., 4 and one-half years; Feb 5 to May 1, 1901; Otit. med. acuta sin.; 12 days ago. sup. of left ear with chills and fever.

Findings and Course—Left auricle stands out; profuse pus from left meatus; drum bulging; Feb. 6, operation left side; gran. in antrum; evacuation of abcess between bone and dura of post. cranial fossa; left sided pneumonia in course of disease; May 1, discharged.

Operation Findings—Extradural abscess of left post. cranial fossa.

Fundus—Feb. 8, right disc, borders indistinct; hyperemia; left disc, hyperemia.

Case 39. Anamnesis—A. T., 35 years; July 17 to 20, 1901; Otit. med. chron. sup. bilat.; some days before admission, painful swelling in region of left ear, extending to the left side of neck; frequent vomiting, fever and chill.

Findings and Course—Very sick appearance; temperature 39.9°; pulse 98; sensorium free; percussion sensitiveness of head; left jaw angle and side of neck painful; defect of drums both ears; fetid sup. left ear; July 18, torticollis; swelling left side neck; temperature 41.1°; operation left side; choles.; sinus wall thickened; non-purulent softened

thrombus removed from sinus; good condition after operation; July 19, headache; edema left lids; slight exophthalmus both sides, more on left; July 20, edema of lids, and exophthalmus, more on left side; unconscious; death.

Autopsy—Thombosis of left sinus transv. and sinus cavernosus; arachnitis purulenta.

Fundus—July 17, normal.

Case 40. Anamnesis—B. S., 40 years; Aug. 10 to 13, 1901; Otit. med. sup. chron. dext; for some weeks, headache and dizziness.

Findings and Course—Very sick; temperature 38.7°; pulse 120; right jaw angle and side of throat painful, as is movement of head; fetid discharge from right ear; Aug. 11, operation right side; gran. in antrum; tegmen carious; bare dura thickened; infiltrated with pus; puncture and incision of temp. lobe gives pus; Aug. 13, death.

Autopsy—Abscess of right temp. lobe; dura of m. cranial fossa covered with pus externally.

Fundus—Aug. 10, normal.

Case 41. Anamnesis—Mrs. L., 50 years; Nov. 25, 1901, to Feb. 14, 1902; admitted to internal clinic complaining of headache, vomiting, aphasic disturbances; pulse 48; sent to ear clinic.

Findings and Course—Pulse 56; left drum bulging; defect above, from which protrude white masses; Nov. 26, operation left side; choles., tegmen perforated; puncture through dura gives fetid pus; incision temp. lobe gives 4 tablespoonfuls pus; Nov. 27 aphasia better; Dec. 10, aphasic disturbances; Dec 20, pus on change of dressing; pulse 60; paraphrasia; Dec. 29, paraphrasia; Jan. 20, left room first time; Feb. 14, discharged, cured.

Operation Findings—Abscess left temp. lobe.

Fundus—Nov. 23, normal; Nov. 30, borders left disc slightly indistinct; Dec. 24, left side plain choked disc, veins very tortuous, hemorrhages near disc; right side almost normal; Dec. 27, left side, choked disc less; hemorrhages still present; right side normal; Jan. 5, left side, hemorrhages increased; right side, spindle-shaped hamorrhage near border of disc; Jan. 27, left side, hemorrhage less; right side, unchanged; Feb. 14, borders of left disc not sharp; no swelling; right, normal.

Case 42. Anamnesis—F. E., 9 and one-half years; Sept. 8 to Nov. 9, 1903; Otit. med. sup. chron. bilat; several days ago, convulsions right half of body.

Findings and Course—Unconscious; nystagmus; fetid pus from stenosed, left meatus; drum red, swollen; Sept. 10, amnesic aphasia; paresis right facial nerve, and right arm; Romberg positive; Sept. 11, operation left side; gran. and pus; sinus and dura middle and post. cranial fossae lie bare, thickened; temp. lobe incised; 100 cm. pus; after operation aphasia and paresis arm improved; Sept. 24, headache, nystagmus. Sept. 25, headache, from the region behind the first abscess cavity comes pus; Oct. 8, evacuation of new pus from cavity in temp. lobe; Oct. 11, intelligence unimpared, aphasia pronounced; Oct. 19, evacuation large amount pus from the abscess cavity; Oct. 24, medial from first cavity is a second, size of walnut; Oct. 29, temperature 40°; pulse 90; somnolent; Oct. 30, mydriasis right side; facial paresis; Nov. 8, death.

Autopsy—Abscess in left temp. lobe; very cloudy fluid in meshes of pia; in post. cranial fossa, 1½ tablespoonfuls of cloudy fluid.

Fundus—Sept. 10, borders of discs sharp, veins very full, tortuous, dilated; Sept. 12, right side normal; left side, fullness and tortuousness of veins; Sept. 24, left side moderately choked disc; vessels bent; tortuous, very full; Oct. 11, left side choked disc increased; right side, borders of disc sharp, inferior veins tortuous; Oct. 19, left choked disc increased; right side, choked disc has developed; Oct. 31, bilateral choked disc; Nov. 2, bilateral choked disc, left side greater.

Case 43. Anamnesis—Mrs. M., 36 years; Sept. 7 to 12, 1903; Otit. m. sup. chron. dext.

Findings and Course—Pain in neck on movement of head; temperature 39.9°; thick pus in right meatus; Sept. 7, operation right side; large choles. that has ulcerated lateral and post. semicircular canals; dura of mid. and post. cranial fossa normal; sinus normal; puncture of dura gives no pus; lumbar puncture; in fluid clots, leucocytes and diplococci; Sept. 11, lumbar puncture, almost pure pus; Sept. 12, death.

Autopsy—Meningitis purulenta.

Fundus—Sept. 7, normal; Sept. 8, normal borders, no hyperemia.

Case 44. Anamnesis—R. K., Jan. 29; Otit. m. sup. chron. dext.; several days before admission, pain in right ear; swelling behind it; dizziness and chill.

Findings and Course—Right auricle stands out; edema over right squama temporalis; right lower jaw angle and

mast. painful: Jan. 29, operation, right side; opening of large extradural abscess of mid. cranial fossa; puncture of temporal lobe gives no pus; Jan. 30, dizziness on sitting up, nystagmus.

Operation Findings—Extradural abscess of right middle cranial fossa.

Fundus—Jan. 29, normal.

Case 45. Anamnesis—R. L., 26 years; Feb. 11 to 18, 1904; Otit. m. chron. sup. dext.; chill shortly before admission.

Findings and Course—In right meatus, pur. secretion; swelling behind right auricle; Feb. 11, operation, right side; bone sclerotic, hyperemic, pur. thrombus removed from sinus after previous ligation of v. jugul.; Feb. 13, pain in left knee and shoulder joints; Feb. 16, unconscious; Feb. 18, death; temperature throughout, feverish, going as high as 40°.

Autopsy—Pur. sinus thrombosis right side; pur. infiltration of pia over velum medul. ant.; pia of convexity diffusely cloudy; fluid in lat. ventricles; benign thrombus in right sinus petrosus superfic.

Fundus—Feb. 16, normal (v. Haselberg).

Case 46. Anamnesis—Mrs. B., Dec. 19, 1903, to Jan. 26, 1904; Otit. med. sup. chron. dext.; for some days vomiting, headache, chills.

Findings and Course—Very sick aspect; pain on right side neck; headache; dizziness; Romberg positive; soft parts over right mast. infiltrated; right side neck like a cord; Dec. 19, operation, right side; pus in mast.; sinus wall, yellowish discolored, necrotic, removal of thrombus from sinus after ligation of v. jugal.; perisin. sup. Dec. 24, condition good. Jan. 26, discharged.

Operation Findings—Purulent sinus thrombosis left side; perisin abscess.

Fundus—Dec. 19, normal (before operation). Feb. 24, normal.

Case 47. Anamnesis—M. B., 48 years; Jan. 13 to Feb. 21, 1904; Otit. med. acut. sup. dext.; 8 days before, pain in right ear, after operation on nose; dizziness since yesterday.

Findings and Course—Pressure sensitiveness on right mast.; in right meatus is non-fetid pus; drum swollen, indistinct; paracentesis; Jan. 25, operation, right side; bone hyperemic, pus and granulat. after chiseling; sinus blue, injured in removal of gran.; great hemorrhage; dura of m.

cran. fossa healthy; Jan. 30, normal temperature; Feb. 4, headache; temperature 39°; during change of dressing, sinus seems discolored at one place; Feb. 5, pus comes from region of bulb. v. jugul.; ven. jugul. ligated; Feb. 20, coma; lumbar puncture gives a clean fluid under increased pressure; punct. of cerebellum and temp. lobe give large amount liquor cerebrospinalis; Feb. 21, death.

Autopsy—Pur. thrombus in bulb. ven. jugul., and uppermost part or v. jugul.; large amount clear fluid between meshes of pia, edema of pia; swelling of spleen with pur. metastases.

Fundus—Jan. 14, both papilla hyperemic, temp. borders indistinct (v. Haselberg); Feb. 2, neuritis optic. bilat. incip.; Feb. 6, neuritis opt. bilat. Feb. 19, same (right more pronounced).

Case 48. Anamnesis—W. R., 28 years; Dec. 28, 1903, to Jan. 15, 1904; Otit. med. chron. sup. dext.

Findings and Course—Tuberc. of larynx; otitis probably of tuberc. origin; two perforations in right drum; Dec. 29, mastoidectomy, antrotomy; on account of chill, sinus laid bare Dec. 30, without any result; Jan. 5, incision of sinus after ligat. of v. jugul.; sinus found thrombosed towards bulb; sent to internal clinic.

Operation Findings—Thrombosis right sinus.

Fundus—Jan. 15, both sides normal.

Case 49. Anamnesis—A. P., 10 years; Jan. 10 to Mar. 7, 1903; Otit. med. sup. acut. sin.; three weeks ago, pain in left ear after inflammation of throat.

Findings and Course—Anemic, venous noises, left mast. sensitive to pressure; pupils equal, react; no nervous symptoms; no nystagmus; paracentesis gives thick pus; temperature normal; pulse 80; no torticollis; Jan. 11, good condition; lumbar puncture; fluid clear and pressure not increased; Jan. 12, temperature 37°; pulse 70; good condition; Jan. 13, same, paracentesis; Jan. 14, nausea, some dizziness; pulse 54; operation left side; during narcosis, pulse 48 to 56, afterwards 60; torpid gran.; free pus, sinus wall not carious; thrombus found by puncture; same removed after ligation of v. jugul.; Jan. 17, pulse normal; Mar. 1, condition good, wound almost healed; Mar. 7, discharged, improved.

Operation Finding—Sinus thrombosis left side.

Fundus—Jan. 11, bilateral choked disc, veins widened and tortuous, partially disappearing at border of protruding disc (v. Haselberg); Jan. 12, same; Jan. 14, choked disc increased

on both sides: veil over veins; no hemorrhages; Jan. 17, same; Feb. 2, left side; hemorrhage, size of head of needle, at border of disc; bilaterally, striae of retina around disc; Mar. 7, choked disc both sides; prominence of disc, right side, 1-2 D; left side, 2-3 D.

Case 50. Anamnesis—F. N., Jan. 25 to Feb. 22, 1903; Otit. med. sup. chron. sin.

Findings and Course—Edema and pressure sensitiveness of left mast; profuse non-fetid sup. left ear; defect in drum; Jan. 26, operation, left side; gran., pus; pus from post. cran. fossa; sinus unaltered: Jan. 27 to Feb 5, erysipelas of right arm; Feb. 5, operation, left side; sinus discolored at one place, covered with gran.; operation stopped by hemorrhage; Feb. 8, sinus looks well on change of dressing; Feb. 19, temperature 38.7°; edema of left squama, no Kernig nor Trousseau, no torticollis; operation, left side; discolored thrombus removed from sinus; Feb. 20, paraphasia; Feb. 22, weak; icterus, Kernig positive; Feb. 23, death.

Autopsy—Pur. sinus thrombosis left side; pur. infiltration of pia of left hemisphere; inner surface of dura shows numerous deposits; extradural abscess of post. fossa found at operation.

Fundus—Jan. 25, normal; Feb. 20, normal.

Case 51. Anamnesis—E. A., 25 years; Jan. 22 to Feb 8, 1903; Otit. m. chron. sup. sin.

Findings and Course—Temperature 39°; chill; Jan. 24, operation left side; gran in mast.; Feb. 1, amnesic aphasia; Feb. 2, operation left side; removal of roof of m. cran. fossa; pus between bone and dura; puncture of discolored, softened dura gives fetid pus; opening of abscess of temp. lobe; Feb. 6, somnolence; Feb. 7, paresis right facial, right arm and leg; Feb. 8, death.

Autopsy—Abscess left temp. lobe size of hen's egg; extradural pus in m. cranial fossa.

Fundus—Jan. 22, normal; Feb. 2, both sides normal (v. Haselberg); Feb. 6, normal (v. Haselberg); Feb. 7, normal.

Case 52. Anamnesis—W. B., 14 years; Nov. 4, 1902, to Jan. 4, 1903; Otit. med. sup. chron. bilat; 18 days ago mastoidectomy on account of swelling behind right ear.

Findings and Course—Right side, total defect of drum; head movements free; Nov. 6, operation right side; choles., smeary granul.; sinus incised; removal of partially decomposed thrombus; ligation of v. jugul.; Nov. 14, no Kernig, no torticollis; Dec. 8, diffusely clouded fluid under increased

pressure obtained by lumbar puncture; some leucocytes: Dec. 16, sleepy, headache, no Kernig, no torticollis; Dec. 30, unconscious, Kernig positive, plain torticollis; Jan. 3, death.

Autopsy—Meningitis purulenta; pyocephalus.

Fundus—Nov. 5, beginning neurit. opt. sin; right side dilated veins; Nov. 12-14, bilat. neurit. opt., more on right side (v. Haselberg); Nov. 19, left disc swollen, borders entirely disappeared, vessels tortuous, right temp. border fairly distinct, others indistinct; Dec. 8, bilat. neurit opt.; Dec. 16, bilat. neurit. opt.; Dec. 30, same.

Case 53. Anamnesis—W. K., 44 years; May 5 to July 23, 1903; Otit. med. acut. dext.; for three weeks discharge from right ear; for three days headache, swelling over right squama.

Findings and Course—Right half of head sensitive to pressure, edematous; right drum red and thick; May 6, operation, right side; pus in region of mid. and post. cran. fossae; dura here covered with gran.; pus near sinus, sinus filled with thrombus; July 23, discharged.

Operation Findings—Extensive extradural abscess of mid. and post. cran. fossae; non-purulent sinus thrombosis.

Fundus—May 5, left disc distinct; right disc, nasal border, slightly indistinct.

Case 54. Anamnesis—A. S., 13 years; June 4 to July 1, 1903; Otit. med. chron. sup. dext.

Findings and Course—June 5, operation, right side, sinus wall and cerebellar dura discolored in places; thrombus removed from sinus which was not entirely obstructed; July 1, discharged.

Operation Findings—Sinus thrombosis, right side.

Fundus—June 4, both sides normal.

Case 55. Anamnesis—R. H., 15 years; June 5, to July 21, 1903; Otit. m. acut. sin; headache for several days.

Findings and Course—Pale boy; headache left side; left side of head sensitive to percussion, left mast. to pressure; pupils equal, react.; no nervous symptoms; temperature 40°; pulse 120; June 6, operation left side; pus in post. cran. fossa; sinus wall covered with gran., sinus filled with thrombi to the confluens sinuum; June 7, temperature 38.8°; pulse 108; June 11, temperature 39°; wound doing well; July 22, discharged.

Operation Finding—Sinus thromb. left side, extra-dural abscess post. cranial fossa.

Fundus—June 5, great hyperemia of both discs, borders

not clear; June 10, same; June 23, bilateral mild neurit. opt. (v. Haselberg); July 16, borders of right disc indistinct, nasal border, left disc, indistinct; same finding on exit, July 22.

Case 56. Anamnesis—E. F., 24 years; April 28 to May 26, 1903; Otit. med. chron. sup. bilat.

Findings and Course—Temperature 39°; pulse 56; right mast. sensitive to pressure; Apr. 26, operation right side; sinus incised after ligation of v. jugul, dirty yellow thrombus removed; May 1, apathetic; pulse 52; May 2, pulse between 50 and 60; May 16, pulse 80; patient stood up for first time; May 26, discharged.

Operation Findings—Sinus thrombosis right side.

Fundus—Apr. 29, both sides normal (before operation). May 2, normal.

Case 57. Anamnesis—E. M., 28 years; Sept. 1 to Oct. 16, 1903; Otit. med. sup. acut. dext.; for 5 days, fever, swelling of region behind right ear.

Findings and Course—Edema of region of right mast. and squama; head movements free, no Kernig, no Romberg; much pus from right ear; Sept. 2, operation right side; gran., sinus wall thickened; after ligation of v. jugul. decomposed thrombus removed from sinus; Oct. 16, discharged.

Operation Findings—Thrombosis of right sinus.

Fundus—Sept. 1, entirely normal; Sept. 5, normal.

Case 58. Anamnesis—C. H., 48 years; May 19 to July 9, 1903; Otit. m. acut. sup. dext.; dizziness for 14 days.

Findings and Course—Very sick appearance, some nystagmus, right meatus stenosed, non-fetid pus; May 20, operation right side; gran., sinus and dura of mid. and post. cran. fossae laid bare, normal; puncture of dura yields liquor cerebrospinalis; after operation, pulse 44; May 25, good condition, pulse 64; June 1, pulse 64; June 2, temperature 38.2°, pulse 120; apathetic; June 3, operation, right side; thrombus in sinus, bulbus v. jug., and beginning of v. jug.; July 9, discharged.

Operation Findings—Thombosis of right sinus.

Fundus—May 22, normal.

Case 59. Anamnesis—Mrs T., 31 years; Jan 24 to May 20, 1903; Otit. m. sup. chron. bilat.

Findings and Course—Jan. 25, operation right side; ligation of v. jug.; removal of thrombus from sinus; Jan. 31, operation, removal of sup. thrombus from bulb; Feb. 3,

pyemic fever; Feb. 16, entire sinus laid bare; thrombus removed; May 21, discharged.

Operation Findings—Purulent thrombus right sinus.

Fundus—Mar. 2, normal.

Case 60. Anamnesis—P. W., 15 years; Feb. 18 to Mar. 15, 1903; Otit. m. chron. sup. sin.; exacerbation of the otitis 8 days ago.

Findings and Course—Temperature 39.6°; pulse 120; pain on pressure over the left mast. and region of left v. jug.; Kernig indicated; pus from left meatus; drum reddened, swollen; sensorium free; Feb. 18, operation left side; little pus in mast.; sinus covered with discolored gran.; after ligation of the v. jug., removal of pur. thrombus from sinus; Feb. 22, temperature 40°; lumbar puncture gives a cloudy fluid under increased pressure, containing streptococci; severe icterus, spleen increased, mild torticollis; Mar. 5, death.

Autopsy—Purulent thrombus left sinus; meningitis purulenta of base of brain; hydrocephalus.

Fundus—Feb. 18, normal; Feb. 22, normal; Feb. 26, normal.

Case 61. Anamnesis—M. H., 27 years; Mar. 12 to 15, 1903; Otit. med. chronic sup. dext.

Findings and Course—Nystagmus, Romberg positive, dizziness, vomiting, headache, stenosis of right meatus, post. wall sagging; Mar. 13, operation, right side; choles., gran.; sequestrum of part of the lateral and post. semicircular canals; sinus unchanged; on the dura of cerebellum, gran.; puncture gives no pus; Mar. 15, puncture of cerebellum gives pus; abscess opened; death on same day.

Autopsy—Abscess of right half cerebellum; its arachnoidea adhering to the dura; cranial wound rounded off; no thrombus.

Fundus—Mar. 12, nasal border of disc indistinct; veins dilated, and on the right side tortuous; Mar. 14, nasal borders of both discs indistinct (v. Haselberg).

Case 62. Anamnesis—J. T., 24 years; Sept. 22, 1902, to Jan. 9, 1903; Otit. m. chron. sup. sin.; headache for 3 days.

Findings and Course—Temperature 38.7°; fetid discharge left side; upper meatus wall hangs down; Sept. 24, temperature 39°; left mast. sensitive to pressure; somewhat stupid; pulse 60; pain in neck on movement of head; Sept. 25, temperature 38.2°; headache; pain in neck more severe; lumbar puncture; pressure increased; fluid diffusely cloudy; Sept.

25, operation, left side; antrum and m. ear full of gran.; tegmen not carious, dura of m. cranial fossa not pulsating, otherwise normal; puncture of temp. lobe; no pus; Sept. 26, headache, torticollis, and positive Kernig; Oct. 4, lumbar puncture, fluid diffusely clouded; Nov. 1, lumbar puncture, slightly cloudy fluid, containing numerous leucocytes and encapsulated diplococci; Nov. 14, Kernig very distinct; Trousseau present; Dec. 17, no dizziness; Jan. 9, 1903, discharged.

Operation Findings—Meningitis purulenta (?).

Fundus—Sept. 22, normal; Sept. 24, veins more filled than on 22; Sept. 26, veins very full; Sept. 28, veins very full, disc sharply defined; Oct. 17, normal; Oct. 20, normal; Nov. 17, normal (v. Haselberg).

Case 63. Anamnesis—H. G., 26 years; Feb. 25 to Mar. 11, 1903; Otit. m. acut. sup. dext.; about the middle of Feb., pains in right ear and mastoid paracentesis.

Findings and Course—Region of right mast. swollen; sensitive to pressure; pupils equal, react; pus in right meatus; post. super. wall sags; no nervous symptoms; Feb. 26, operation, right side; gran.; free pus; pus in post. cranial fossa; Mar. 10, discharged.

Operation Findings—Extradural abscess of post. cranial fossa.

Fundus—Feb. 25, sharply defined discs on both sides.

Case 64. Anamnesis—A. W., 17 years; Jan. 24 to 26, 1903; Otit. m. chron. sup. bilat.; brought to clinic unconscious.

Findings and Course—Temperature 40°; unconscious; jaw muscles tensed; slight torticollis; pus in both meati; left drum greatly inflammed; Jan. 26, death.

Autopsy—Meningitis of convexity, of frontal lobe and base; hydrocephalus of ventricle; several spots of caries of temporal bone.

Fundus—Jan. 24, bilateral choked disc; discs hyperemic veins full and bent.

Case 65. Anamnesis—F. P., 3¼ years; April 15 to 18, 1902; Otit. med. sup. chron. bilat; lately vomiting; grasps at the right side of head with hand; convulsions of left half of body.

Findings and Course—Pale child, comatose; Cheyne-Stokes respiration; lumbar puncture; clear fluid with clots containing pus corpuscles; April 15, operation, right side; purulent gran. in mast. and m. ear; dura healthy externally;

puncture, blood fluid with floculae; April 16, 2nd operation, right side; hyperemia of pia, thickening of dura; April 17 and 18, convulsions; April 18, death.

Autopsy—Meningo-encephalitis multiplex; meningitis hemisphaer. dext.; pachymeningitis interna hemorrhagica purulenta; caries ossis petrosi.

Fundus—April 15, normal. April 16, normal.

Case 66. Anamnesis—H. O., 13 years; Feb. 3, 1900, to Jan. 21, 1901.; Otit. m. chron. sup. sin. with acute exacerbation; headache for 8 days, especially of left side of head; sleepy.

Findings and Course—Delicate girl, weak, temperature 37.5°; pulse 78; Romberg negative; left mast. sensitive to pressure; left auricle stands out; pus in left meatus; post. sup. wall sags; Feb. 7, operation, left side; choles.; tegmen carious; Feb. 10, evening rise of temperature; apathetic; Feb. 13, sleepy, vomiting, pulse 54; aphasic symptoms; operation left side; evacuation of abscess in temp. lobe.; pulse before operation 52, afterwards 80; Feb. 14, aphasia less, apathetic; Feb. 20, apathetic; Feb. 21, evacuation of pus; Mar. 9, patient freer, sits up in bed; Mar. 12, somnolent, pale, slight bilateral ptosis, aphasia increased; Apr. 9, condition good; July 16, nervous findings; irritative discondition of brain, objective symptoms of local brain disease not present; wound normal; Jan. 20, discharged.

Operation Findings—Abscess of left temp. lobe.

Fundus—Feb. 13, bilat. choked disc; Feb. 19, both discs cloudy, borders indistinct, veins tortuous, thin arteries in places hidden by edema of discs, left more so; retina near disc slightly cloudy; Mar. 9, bilat. choked disc felt more pronounced; Mar. 14, discs yellowish red, borders indistinct, veins tortuous, swelling of discs, 1½-2 D.; Apr. 6, same; May 23, choked disc seem receding; June 21, no swelling of disc, hyperemia, borders somewhat indistinct; Nov. 3, discs still cloudy.

Case 67. Anamnesis—E. S., 23 years; Feb. 12 to Aug. 3, 1898; Otit. med. chron. sup. sin.

Findings and Course—Complains of dizziness, foul pus in left meatus; Mar. 1, operation left, gran. in antrum and m. ear, antrum wall carious; Mar. 3, normal temperature and pulse, good condition; Mar. 6, temperature 39.5°; pain in head and neck, vomiting; Mar. 7, pulse 68; Mar. 24 and 25, April 8 and 9, chills; Apr. 21, headache, dizziness; Apr. 29, vomiting, headache; May 1, repeated vomiting, pulse 58, 60,

headache, apathetic; May 6, somnolent; May 7, abducent paralysis left side; delirium: May 8, operation left side; evacuation of cerebellar abscess, conscious after operation; May 9, sensorium free, abducens paralysis somewhat receded; May 11, paralysis gone; May 30, out of bed; cerebellar wound healing; Aug. 3, cured, discharged.

Operation Finding—Cerebellar abscess.

Fundus—Mar. 28, normal; Apr. 28, entirely normal, fundus pale; May 6, neuritis optica bilat.; discs swollen, borders indistinct, veins tortuous; May 11, neuritis left side same amount, right side somewhat less; May 26, right side radiate marking of disc; swelling (2 D.), edema of retina, veins very tortuous, arteries narrow, punctiform hemorrhages left side, slight changes; June 13, both discs redder than normal; borders indistinct; no swelling; vessels of normal contents.

Case 68. Anamnesis—A. L., 25 years; Jan. 8, to Feb. 8, 1903; Otit. med. chron. sup. sin.; since the end of the last month, headache, dizziness, vomiting, aphasia.

Findings and Course—Very sick, apathetic, distinct amnesic aphasia, sentitive on percussion on left half of head; fetid pus from left ear; meatus stenosed, drum red and swollen; operation, left side; choles.: sinus and semicircular canals involved; tegmen antri fistulous; puncture of temp. lobe gives pus; evacuation of abscess in temp lobe; Jan. 9, vomiting, Kernig positive, apathetic; Jan. 10, evacuation of pus, restless, vomited, pulse 60; Jan. 12, aphasia, sleepy, pulse 60; Feb. 3, unconscious, Kernig positive, opisthotonus, pulse 60, exophthalmus; Feb. 8, death.

Autopsy—Abscess of left temporal lobe; meningitis purulenta.

Fundus—Jan. 8, both sides normal (v. Haselberg). Jan. 10, normal; Jan. 21, normal; Feb. 3, normal (v. Haselberg).

Case 69. Anamnesis—W. H., 51 years; December 30, 1902, to January 16, 1903; Otit. med. sup. chron. sin.

Findings and Course—Headache, fetid pus from left ear. January 7th, operation left side; granulations, much free pus. January 9th, temperature 38.8°, pulse 100, Kernig positive, torticollis, Trousseau; lumbar puncture, diffusely clouded fluid containing leucocytes and encapsulated diplococci. January 10th, Kernig and torticollis greater. January 16th, death.

Autopsy—Purulent infiltration of arachnoidea of brain

and cord; purulent fluid in ventricles; brain without focal disease.

Fundus—January 10th, normal (v. Haselberg). January 11th, normal.

Case 70. Anamnesis—H. N., 13 years; Feb. 25 to June 25, 1903; Otitis, med. sup. chron. dext., for 14 days; headache, vomiting, dizziness.

Findings and Course—Somnolent, monotone speech, right half of head sensitive to percussion; right mast. painful, temperature, normal; pulse 80; Feb. 27, operation right side. Thickening of mucous membrane; sinus and dura normal; Mar. 2, lumbar puncture; fluid diffusely clouded; speaks in distinct monotone, sleepy, Kernig, torticollis not present; Mar. 7, operation, puncture of cerebellum gives pus, evacuation of cerebellar abscess; Mar. 11, speech almost normal; Mar. 27, leaves bed for first time; Apr. 26, good condition; June 25, discharged.

Operation Findings—Cerebellar abscess.

Fundus—Borders of left disc indistinct, right shows great hyperemia, filling and tortuosity of veins; Mar. 2, same; Mar. 10, veins on right side fuller, otherwise same; Mar. 13, borders somewhat hazy, veins dilated, not tortuous; Apr. 27, slight cloudiness over discs.

Case 71. Anamnesis—M. S., 20 years; Oct. 18, 1898 to Jan. 31, 1899; Otit. med. sup. chron. dext.; on Oct. 15, acute exacerbation, with fever, chill, vomiting, headache.

Findings and Course—Temperature 40°; pulse 80, very sick, fetid pus from right ear; Oct. 19, operation right side; gran., pus. sinus wall thickened, discolored; Oct. 20, high temperature, vomiting, headache; Oct. 23, swelling of left wrist joint; on dressing, find perisin. pus, wound normal though with pyemic symptoms; Jan. 30, discharged.

Operation Findings—Extradural abscess of post. cran. fossa.

Fundus—Oct. 18, normal; Oct. 23, veins on left side fuller than on right.

Case 72. Anamnesis—B. S., 2½ years; Jan. 30, 1904; Otit. med. acuta sin.

Findings and Course—Anemic; left auricle stands out, left meatus stenosed, superior posterior wall sags; Feb. 1, operation, left side, cavity full of gran.; ext. wall of ascending part of sinus affected, sinus filled with purulent thrombus, ligation of v. jugul.; Feb. 2, knee of sinus full of pus, sinus laid bare far posteriorly, thrombus removed; Feb. 6, normal

temperature; Feb. 10, sits up in bed; Feb. 24, lumbar puncture, clear fluid; Feb. 26, wound in cranium granulating normally; wound course normal; still under treatment.

Operation Findings—Purulent thrombus of left sinus.

Fundus—Feb. 4, normal (v. Haselberg); Feb. 26, normal.

Case 73. Anamnesis—P. N., 11½ years; Dec. 12, 1903, to Jan. 19, 1904; Otit. med. chron. sin.; 14 days ago, severe pain, left side; simultaneously swelling behind left ear.

Findings and Course—L. auricle stands out like a wing; fetid, pus from left meatus, which is stenosed to a slit; gran. in depths, distinct nystagmus towards left side; nervous system normal; Dec. 15, operation; gran., choles., sinus unaltered, extradural pus from post. cranial fossa.; Dec. 30, condition good; patient out of bed; Jan. 19, discharged.

Operation Findings—Extradural abscess of post. cranial fossa.

Fundus—Both sides normal.

Case 74. Anamnesis—W. D., 41 years; Mar. 28, to Apr. 16, 1901; Otit. med. sup. acut. dext., since end of Feb. swelling behind right ear.

Findings and Course—Right auricle stands off; dull feeling in head, temperature normal; Mar. 29, operation; smeary gran. and pus in mast., sinus laid bare, thick walls slit, nonpurulent thrombus removed; normal temperature; Apr. 16, discharged.

Operation Findings—Sinus thrombosis, right side.

Fundus—Mar. 28, normal.

Case 75. Anamnesis—C. N., 19 years; Apr. 18 to May 18, 1903; Otit. med. acute. sin.

Findings and Course—Left auricle stands off, swelling of soft parts behind, no cord formation, no pressure sensitiveness of left side neck; movements of head free, much nonfetid pus from left meatus; April 20, operation, left side; gran. in mast., perisin. pus, sinus covered with gran., in places yellowish discolored, contents normal; Apr. 24, out of bed; wound normal; May 18, discharged.

Operation Findings—Perisinous abscess, left side.

Fundus—Apr. 18, normal.

Case 76. Anamnesis—S. G., Dec. 18, 1902, to Jan. 15, 1903; Otit. med. sup. acut. sin.

Findings and Course—Swelling over left mast.; pain on pressure, no cord formation along v. jug., head movements free; pus in left meatus; Dec. 21, operation, left side, gran.,

sinus bare in part, extradural abscess of m. cran. fossa; Jan. 15, discharged.

Operation Findings—Extradural abscess of m. cran. fossa.

Fundus—Dec. 18, normal.

To obtain an idea of the frequency of pathologic changes on the fundi in otogenous intracranial diseases, I will compare the cases without findings with those where there were lesions of the fundus. In doing this, I have separated the cases with only one intracranial disease from those where several intracranial structures were involved. It is evident that the former would give a clearer picture of the relation between intracranial disease and opticus lesions. In collecting the cases with several diseases, that one would naturally rank as antecedent which caused the opticus lesion.

CASES WITH ONE DISEASE.

Fundus Oculi.

Diseases.	Normal.	Abnormal.
Extradural abscess	5, (44, 63, 73, 75, 76)	2, (38, 71)
Leptomeningitis plural	4, (12, 36, 43, 69)	4, (37, 52, 62, 64)
Sinus thrombosis	10, (27, 29, 48, 54, 56, 57, 58, 59, 72, 74)	2, (47, 49)
Cerebral abscess	4, (9, 14, 30, 40)	4, (15, 21, 41, 66)
Cerebellar abscess	1, (11)	4, (2, 19, (7, 70)
49	24	16

CASES WITH SEVERAL DISEASES.

Extradural abscess		1, 74)
Leptomeningitis purul	2, (7, 65)	
Sinus thrombosis	16, (1, 4, 6, 8, 10, 13, 25, 26, 32, 33, 34, 39, 45, 46, 50, 60)	4, (5, 18, 20, 55)
Cerebral abscess	3, (35, 51, 68)	3, (28, 31, 42)
Cerebellar abscess	2, (22, 23)	5, 3, 16 17, 28, 61)
36	23	13
76	47	29

Since, however, when there is a simultaneous presence of several intracranial complications, it would naturally be difficult to decide which part of which one was to be taken

as the cause of the fundal changes, I have chosen that one which either clinically or pathologico-anatomically stood in the foreground, and which was capable of causing ocular changes.

We see that changes on the fundus are present in every form of intracranial disease, but that they frequently fail in our cases. A preponderance of normal findings over pathological, under similar conditions, is noted also by Hansen and Koerner in their investigations. The latter more frequently found lesions in the combined intracranial diseases than in the simple, something that is not confirmed by us. We find that the changes in the simple and combined are about equally frequent. The following is an analysis of the fundal changes in the different kinds of intracranial complications:

1. Extradural Abscess.

This was found 7 times as the single, otogenous, intracranial complication, 6 times in the posterior and 1 in the middle cranial fossa; accompanied by other complications, it was found 12 times, 3 times in the middle cranial fossa, and 9 times as a perisinous suppuration. Altogether, it was found 19 times.

In these 19 cases, the fundus was 14 times normal and 5 times abnormal. Twice the changes accompanied simple extradural abscesses (38, 71), 3 times combined affections (24, 53, 55). In both simple forms, the changes were of the mildest character; in case 38, there was a bilateral hyperemia of the fundus, on the right side indistinctness of the disc's borders; in case 71, there was at one time a difference in the amount of blood in the veins. In the first case, the changes were discovered 2 days after th abscess was opened; unfortunately, the findings before the operation are not known; at any rate, the changes did not disappear immediately after the operation. Among the three abscesses combined with other intracranial diseases, one, Case 53, is noteworthy; in this case there was an extradural collection of pus of unusual amount; it extended over the middle and posterior cranial fossae of the right side and was under increased pressure, as the operation showed. The abscess was combined with a nonpurulent sinus thrombus, which was probably caused by the pressure of the pus in the posterior fossa on the sinus. In this case also, (the

examination was made a day before the operation), the fundal changes were very slight in spite of the increased intracranial pressure. On the side of the healthy ear, the fundus was normal; on the side of the ear and brain disease, the disc was indistinct nasally; the post-operative examination is absent. In 24 and 25, the symptoms of the extradural suppuration were obscured by the other cranial effections present at the same time. In the cases in our list the fundal changes occurring with extradural abscesses are very rare and very mild. Hansen and Koerner found the same.

2. Leptomeningitis Purulenta.

In no other of the otogenous intracranial complications are there so many differing views of the appearance of the fundus as in the otogenic purulent meningitis.

Zaufal[1] found the neuritis optica so constant in otogenic meningitis that he differentiated this form from other forms of meningitis by the presence of the opticus affections.

Kneiss[2] considered the presence of neuritis optica as the greatest diagnostic aid for purulent leptomeningitis. On the other hand, Pitt[3] believed that opticus changes are always absent in uncomplicated otogenic leptomeningitis purulenta. Among Hansen's cases, the number with optic nerve changes were slightly in excess of those without; Koerner found in 6 uncomplicated cases only normal fundi, of 8 cases combined with other disease 2 had normal fundi and 6 showed changes.

In our 76 cases, purulent leptomeningitis was present 31 times, either as a single intracranial disease or associated with another, sometimes as the chief disease, sometimes as a disease of little importance. 11 of these 31 cases, that is about one-third, showed fundal changes. Of the 8 simple cases, 4 showed changes, i. e. one-half of the cases. In both combined cases in which the meningitis was the prominent diseases, the fundus was normal (7,65). Of the uncombined cases, whose fundi remained normal, case 12 was under observation 3 weeks; the eyes were repeatedly examined, especially on the day of admission and one day before death; always normal. Case 36 was treated almost 2 months; the eyes were examined after 1½ months and were normal; 14 days later death occurred with typical

meningeal symptoms. In case 43 the disease was fatal in 5 days: 2 examination of the eyes made when the meningitis was at its height gave no changes on the fundus. Case 7 was under observation 4 days; a double examination made when the meningitis was most pronounced found nothing abnormal in the eyes. Even case 65, where the autopsy showed an encephalitis and pachymeningitis interna in addition to the meningitis, resulted fatally in 3 days, with normal fundi.

Of the 4 cases, showing changes on the fundus, 2 showed simply a bilateral hyperemia (37, 62); twice there were severe changes in the form of bilateral neuritis optica (52) and choked disc (64). The fortunate results of case 62 could perhaps speak against regarding it as a purulent meningitis. I will remark, however, that the disease ran its course with the plainest symptoms of purulent meningitis; a simple serous meningitis can be excluded with certainity by means of a dozen lumbar punctures that always gave a diffusely clouded fluid with numerous leucocytes and encapsulated diplococci. In case 52, we see a unilateral neuritis optica already developed in 7 days, which lasted 1½ months till death. The autopsy showed a purulent exudate in the ventricle. In case 64, a hydrocephalus accompanied the bilateral choked disc.

3. Sinus Thrombosis.

Thrombosis of the sinus was found 35 times in 76 cases: 12 times it was without any accompanying intracranial complication; 23 times combined with some other disease: in 3 of these cases, its symptoms were overshadowed by the other disease (17, 31, 53). Among these 35 cases, the fundus showed changes only 9 times, twice in the 12 simple cases and 7 times in 23 combined. The rarity of the fundal changes as a symptom of sinus thrombosis is striking. Pitt found exactly the opposite. He considers "the optic neuritis more suggestive of sinus thrombosis than of the other lesions". (Brit. med. Journ., 1890, vol. I, p. 643). Hansen found, in 8 simple cases, changes 3 times; Koerner 1 time in 5 cases. Jansen found neuritis optica or choked disc very seldom in simple sinus trombosis (Archiv. f. Ohrenheilk. Vol. XXXVI, p. 9.)

Let us examine the 2 simple cases with changes on the fundus (47, 49). We find both times profound changes: in

case 47 a bilateral neuritis optica, in case 49 bilateral choked disc. Case 47 was under observation from Jan. 13 to Feb. 21, i. e., over 1 month. On the second day after admission, there was found on both sides a hyperemia of the discs, and in places loss of distinctness; it was 18 days later that the neuritis optica began to develop, and 4 days later it was very distinct; about this time the pus was removed from the sinus, but this had no effect on the fundal changes; the neuritis optica continued to develop until death. A point of interest in this case was the finding of a large amount of a clear fluid in the meshes of the pia, at autopsy. This could also be demonstrated during life by lumbar puncture, and puncture of the dura of the field of operation. In this case, the existence of the neuritis optica is perhaps due to the increased pressure.

Case 49, which showed the most pronounced changes on both fundi, is noteworthy for 2 reasons: First, because for 5 days the choked disc was the only symptom of the intracranial disease. For 5 days there were absolutely no clinical signs of cerebral affection except the local symptoms caused by the ear disease. Not before the fifth day, although the choked disc became more and more pronounced, did other symptoms of brain involvement such as nausea, slowing of pulse, etc., appear. The operation was immediately performed and 3 days later the patient felt well, and there was a normal pulse; the choked disc was unchanged on either side. Even 3 months later the disc was still prominent. The second fact of importance is the favorable course in spite of the high degree of fundal changes. We will later touch upon the question of the role of opticus lesions in the prognosis.

In the 4 cases of combined sinus thrombosis with fundal changes, (5, 18, 20, 55), there was once a simple hyperemia (case 18), 3 times neuritis optica or choked disc. In case 5, a choked disc developed in 12 days, more severe on the side of the diseased ear; the first ophthalmoscopic examination, made after the intracranial disease had existed for about 1 week with well marked and severe symptoms, showed only very slight changes on one side.

Case 55, showed an increase in the opticus changes after the operation and removal of the purulent focus; 17 days after the operation, the simple hyperemia of the disc had developed into a neuritis optica. In case 20, where a bilateral neuritis optica appeared 10 days before death,

there was found at the autopsy an extension of the sinus thrombosis into the sinus cavernosus of the same side. The involvement of the sinus cavernosus was manifested during life by edema of the lids and paralysis of the abducens. Let us compare case 39 with case 20. Here also the autopsy showed an extension of the thrombus from the sinus sigmoideus into the sinus cavernosus, and here also this was expressed by edema of the lids and slight exophthalmus; on the other hand, an examination made 3 days before death showed a normal fundus. The examination was made 1 day before the operation and 2 days before the appearance of the edema; unfortunately the findings of the last 2 days are wanting, however, the disease was fatal in 3 days so that the time for the development of fundal changes was too short.

Jansen furthermore says, that his 3 cases of thrombosis of the sinus cavernosus, even coupled with suppuration of the vena ophth. sup. and the orbital cellular tissue, were free from well marked fundal changes.

4. Brain Abscess.

Our table contains 14 cerebral and 12 cerebellar abscesses. In the cerebral abscesses, the fundus was affected in 7 cases, i. e. in one-half, of which the 8 simple cases include 4 and the 6 combined cases include 3 with changes. Among the 12 cerebellar abscesses were 9 cases with fundal changes and only 3 with normal fundi; these changes were found 4 times in 5 simple cases and 5 times in 7 combined cases.

Opticus changes were found therefore in one-half of the cerebral abscesses and in the vast majority of the cerebellar abscesses; in the simple and in the combined in about the same ratio. PITT found neuritis optica very seldom in brain abscesses, "neuritis is not common with abscess". HANSEN found changes in 6 of 12 cerebral abscesses, i. e. in one-half of the cases, but on the other hand found changes only twice in 7 cases of cerebellar abscesses.

As to the kind of fundal changes, in the simple cases of cerebral abscesses there was twice a slight affection of the vessels (15, 21), and twice a well defined choked disc (41, 60). In the first two cases, which showed the slight changes, the abscesses were of unusual extent. In case 15, almost the entire left hemisphere was changed into an abscess; only a cranial mantle of about 3 centimeters thickness

remaining. The examination made 1 day before the operation gave only a tortuosity of the veins on the side of the disease; 3 days after opening of the abscess both sides were normal. In case 21, the abscess likewise extended from the temporal to the occipital lobe; in the beginning only a marked filling of the veins was observed, to which after the operation an indistinctness of the borders of the disc was added. A characteristic example of the increase in the fundal changes after a successful operation is shown in case 41.

The patient was examined at a time when the cranial pressure symptoms were very pronounced; the fundi were entirely normal. Four days after an abscess in the left temporal lobe was opened, the disc of the diseased side showed slightly indistinct borders; not until 1 month after the operation was a well marked choked disc found on the affected side; 11 days later, severe changes were found on the other side; about 3 months after the first examination, the borders of the disc on the side of the abscess were still not sharp, while the other side had returned to the normal. In case 66, the choked disc was not observed to recede until 3 months after the abscess was emptied.

In the 3 cases of combined cerebral abscess, there were the following changes; in case 28, bilateral neuritis optica, in case 42 bilateral choked disc, in case 31, bilateral marked hyperemia of the disc and retina, indistinctness of the borders of the disc. The severe changes therefore predominate in the cerebral abscesses.

The cerebellar abscesses show the following in regard to the character of the lesions.

Among the simple cases, there were found twice vessel changes, partial indistinctness of the borders of the disc (19, 70) twice bilateral neuritis optica (case 67) or choked disc (case 2).

Among the combined cerebellar abscesses, there were found 3 times neuritis optica, twice on both sides (3, 28), once on the side affected (17), in 2 cases vessel changes and indistinctness of the borders of the discs (16, 61), in case 16, rather well developed. As in the cerebral abscesses, so here there is a preponderance of the severe fundal changes.

The following can be said, as a result of our finding, as to the value of ocular changes in diagnosing diseases of the ear: any intracranial disease of whatever kind or extent can accompany the ear disease without causing the develop-

ment of fundal changes; normal fundi indeed are found oftener. On the other hand, on account of the great rarity of fundal changes in middle ear or mastoid suppuration, their presence is an important symptom in diagnosing an extension of the disease from the middle ear or mastoid to the organs of the skull. This diagnosis is made with certainty when the changes are of a high degree, either in the form of a neuritis optica or choked disc. No conslusion can be drawn from the ophthalmoscopic findings as to the kind of intracranial disease, although certain probabilities can be drawn from the scale of the frequency of the fundal changes in the difference kinds of intracranial diseases. On the basis of the fundal changes, the intracranial diseases to be expected rank as follows: 1. Cerebellar abscess. 2. Cerebral abscess and leptomeningitis purulenta. 3. Extradural abscess. 4. Sinus thrombosis.

There is no rule as to the time of the appearance of the fundal changes. We frequently find the most pronounced changes as early symptom of the intracranial affection, sometimes when, as in case 49, the clinical symptoms are still absent; on the other hand, the clinical symptoms of the complication are often already perfectly distinct while the fundus is normal. The operation removes the purulent focus from the body, and now for the first time a change is observed on the fundus, which sometimes developed still further. Types of such cases are No. 55, in which the neurities optica developed 17 days after the operation, and No. 41.

The changes usually appear simultaneously in both eyes, occasionally they exist for some time on the affected side and attain a marked development before they appear on the other side. An example of this is case 41, where a severe lesion of the fundus of one eye existed 27 days before the other eye showed any changes at all.

In many cases, the opticus affection is unilateral throughout the entire disease; e. g. in the 3rd case of group 2 (cases without pathologico-anatomic findings), where during 3 weeks, 5 examinations always gave a unilateral neuritis optica, the other eye being normal.

In this case, however, the ear disease was on the side of the healthy eye. Unilateral development of fundal changes occurred, also, in cases 15, 16 and 17, always on the side of the intracranial affection. Accordingly the finding of fundal changes on one side would allow the almost certain

deduction that the affection was on the same side of the brain. That, however, does not follow for the side presenting the greatest change, when both eyes show changes.

We come now to the question of the value of fundal changes in the prognosis of the intracranial disease. A comparison of the cured and fatal cases allows a conclusion to be drawn.

	Fundus	
Cases with fatal termination 47	Normal 29	Altered 18
Cases with favorable termination 29	Normal 17	Altered 12

We see that fundal changes are seen slightly more often in the cases with a favorable course than in those ending fatally. The appearance of an opticus lesion in the course of an intracranial disease does not necessarily mean a change for the worse. The prognostic value of fundal changes lies perhaps in their severity. The following is a comparative collection of our favorable and unfavorable cases on the basis of the kind of opticus affection.

Cases with Fatal Termination: 18 changes—7 vessel changes, 11 neuritis optica or choked disc.

Cases with Favorable Termination: 12 changes—5 vessel changes, 7 neuritis optica or choked disc.

We see that the more severe changes do not appear more often in the fatal than in those that get well. A difference is introduced, in regard to the frequency of the presence of severe fundal changes in the cured cases, when the cases of the second group (ear diseases with cerebral symptoms without pathologico-anatomic findings) are added. The conclusions to be drawn are that the changes on the fundi give no judgment as to the course and result of the intracranial diseases. The appearance of even the most severe changes on the fundus does not exclude a favorable termination of the disease.

I desire, in conclusion, to express my thanks to Geheimrath Prof. Dr. Passow for his kindness in allowing me to use the material.

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ABSTRACTS FROM CURRENT OTOLOGIC, RHINOLOGIC AND LARYNGOLOGIC LITERATURE.

I.— EAR.

Speech-Hearing.

F. H. Quix (*Netherlands Laryng., Rhin. and Otol. Society*) refers to the fact, that the results of determining the hearing acuity with the whispering voice are very changeable and not comparable with single tones. This can be eliminated by using the whisper in the following way: The sounds are divided in three rubrics: low, high, and mixed sounds. The whispered sounds also can be divided into groups, so that the strength of sound is equal for sounds of the same group. The comparison of the hearing acuity for words of a certain group can easily be made with special tuning forks, (preliminary communication). Prof. Zwaardemaker stated that Dr. Reuter (Ems) repeated these experiments this winter with the German language. The hearing acuity of his people was 1.3 times larger than the average of the people of Quix; the three distance zones bear a proportion as 1-2-4, so that every hearing acuity must be represented with 3 values. Our usual clinical hearing acuity is the average of these 3 numbers.

Quix stated, in reply to Dr. Moll, that for practical purposes it is sufficient to use words of the intermediate zone.

Blaauw.

Malignant Angioma, Starting from the Auricle.

Struycken (*Netherlands Laryng., Rhin. and Otol. Society*) saw a child, some weeks old, where an angioma formed in a few months, starting from the external ear canal, which spread from the jugulum for four fingers' width over the almost completely destroyed auricle and from the proc. zygomaticus toward the occiput. Neither cauterisation, nor electrolysis, etc., could stop the growth. Extirpation was too dangerous, therefore tying of the large vessels of the neck was decided upon: Vena jugularis in- and externa, which had a diameter of 1.5 cm. and also the common carotid were tied twice, but not cut through.

Patient stood this very well; the tension of the tumor diminished considerably; on the operated side the skull showed during the first weeks a distinct flattening, which, however, slowly disappeared. *Blaauw.*

Pathological Anatomy of the Labyrinth.

Dr. F. H. Quix (*Netherlands Laryng., Rhin. and Otol. Society*) used a combination of celloidin with cedar oil and paraffin, which fills all holes well, and the specimen can be treated as paraffin section. The whole labyrinth gives hundreds of sections 10 to 15 m. For the sake of cheapness he uses the varnish of Cox, as used in psychiatry, and for object glasses photographic plates which had been used. He shows serial sections of different animals so treated, as cavia, mouse, pig, horse, etc. In the collection of Prof. Zwaardemaker he had found an old specimen with the diagnosis "labyrinth-deafness with phthisis pulmonum" (1893) without further comment. It shows atrophy of the organ of Corti; all nerve elements have disappeared and are replaced by epithelial cells, which form in some places a small plug upon the membrana basilaris. The membrana tectoria is greatly diminished in size in all its windings and sticks to the epithelial plug. The rest of the organ of corti is a small streak on the surface of this plug in the superior windings. This is interesting as the true nature of the function of this body can perhaps be learned, because we might deduce that when the organ of Corti atrophies, which here is very clear, the membrana tectoria also atrophies and can adhere to the remnant of the organ. The nerve fibres and ganglia cells seem to be without change; the entire middle ear, cut in connection with the cochlea, is entirely normal.

Dr. Quix then showed dancing-mice, which he found to give reaction to no tone, while white mice react to all tones between E^2—C^8, while their sensitive zone stretches over the fifth and sixth striped octave. We may deduce with a great amount of probability, that the gamut of the sensitive zone for mice, in comparison to men, is transferred upward nearly an octave. *Blaauw.*

A Case of Otogencus Sinus Thrombosis with Large Extradural Abscess.

Zaalberg (*Netherlands Laryng., Rhin. and Otol. Society*) showed the girl, who suffered from an otitis media sinistra two

years ago, which then apparently healed. In June, 1903, pain over the left mastoid appeared, with little secretion from the ear. On July 5 rigors appeared with rise of temperature to 40°; a couple of days later the temperature was intermittent, between 40.1° and 35.5°. The general condition grew worse, the swelling behind the ear increased; now and then vomiting spells. Pulse and respiration in accordance with the temperature. On July 30 Zaalberg saw the patient for the first time. He made the diagnosis of mastoiditis with probable sinus thrombosis, and operated. The pus, of a bad odor, streamed out; a fistula in the planum mastoideum was enlarged with Doyen's drill; the wall of the sinus was discolored; no blood was found with the syringe, the wall was cut open with a pair of scissors. The cranial cavity was also opened and a mass of pus escaped. Convulsions put an end to the operation. On the next day the temperature did not rise above 38°, but much pus came from the side of the bulbus jugularis, also after pressure on this region. Therefore the bulbus jugularis was laid open on August 2, after which the suppuration ceased. Thereafter uninterrupted recovery. Zaalberg treated also a 60-year-old woman with thrombosis of the sinus, who came stuporous into the hospital; she again regained consciousness after a few collargol injections, and recovered. Although collargol injections may be of no value, and it cannot be said with certainty in this case that the favorable turn was due to the collargol action, it is remarkable that patient recovered, considering the seriousness of the disease and the very unfavorable prognosis. As he had not seen any unfavorable consequence he recommends it warmly. *Blaauw.*

A case of Extra-dural Abscess.

I. C. HENKES (*Netherlands Laryng., Rhin. and Otol. Society*) saw for the first time, end February, 1903, a 38-year-old woman, who complained of pain behind the right ear, radiating toward the occiput, running ear and deafness on the same side. Three months previous she had influenza with much headache and especially pain behind the ear. After recovery earache came on, which being treated with eardrops and poultices, resulted in a discharge a few weeks later. The occipital pain was severe especially in the night. She looked bad; pulse 88, regular. A little, non-fetid pus in the right external ear. After removal, a small perforation behind the umbo became visible, the drum was somewhat injected. Only the posterior

part of the proc. mastoideus was a little sensitive. Behind the mastoid a little swelling was found and some pain on pressure but no discoloration of the skin was seen. The watch was heard only on pressure against the ear, whisper in the direct proximity; secretion moderate. The perforation was enlarged with the knife; ice behind the ear. No change in the condition within 14 days. She was operated on March 17; on the evening before, the temp. was 36.9°, pulse 88. After shaving, a place behind the mastoid, size of a dollar, was found edematous, no discoloration of the skin. Retroauricular incision down to the bone, which was not changed. No pus nor granulations in the antrum or the adjoining cells. An incision 4 cm. in extent, backward, perpendicular to the first one, was made. The bone here was soft, cells with pus and granulations were found in the depth, also a fistula, going forward and inward, becoming finer and then lost. On removal of the posterior pus-containing cells, a teaspoonful of thick yellow pus appears from between dura and bone. Sinus and dura, both covered with bluish-red granulations, were laid bare. The sinus lay very far backward, did not pulsate, was elastic. Henkes, after removal of the granulations and diseased bone, tamponed loosely with iodoform gauze. Highest temperature after the operation: 37.5°. The headache immediately disappeared; after a week she was treated in policlinic and the otitis media was already healed. The wound healed in a month. A slight noise in the ear was cured by Politzerizing; whisper at 5 meters. Although it can never be determined with absolute certainty. Henkes believes this extradural abscess to be the sequence of a primary ostitis of the mastoid after influenza, while the otitis media was secondary. In this case the symptom of Griesinger (edematous swelling and sensitiveness on pressure without discoloration of the skin behind the intact pars mastoidea on the border of the os occipitale and at the posterior part of the mastoid itself) was not the consequence of passive edema but of inflammatory edema. *Blaauw.*

A Case of Cured Otitic Sinus Thrombosis.

P. TH. L. KAN (*Netherlands Laryng., Rhin. and Otol Society*) showed a 20-year-old workman in a factory, who had been taken to the surgical ward of the Leiden Hospital with a bilateral otorrhea; Prof. Korteweg made the diagnosis of otitic sinus thrombosis with thrombosis of the vena jugularis; he opened the latter and drained it. Kan performed radical

operation the next day, when he found a purulent thrombosis of the sinus transversus. The thrombus was removed as much as possible and iodoform glycerin was injected upward from the wound of the jugularis. The reaction of the wound was normal on the left side, but the fever remained and 13 days after the operation an extensive edema of the occiput and face appeared on the right side. A hard cord was felt under the right musc. sternocleidomast. Prof. Korteweg opened the right vena jugularis which contained fluid blood under more than normal pressue. Kan then performed the radical operation on the right side; the bone of the mastoid was filled with blood under high pressure, a purulent cholesteatoma in the middle ear cavities, the sinus contained fluid blood under very high pressure. The bad condition of the patient did not allow the performance of a plastic. High temperature still remained for many days, an extensive decubitus and a perichondritis of the left auricle being the cause, but finally he was cured. The wound behind the auricle closed per granulationem. Kan could not explain satisfactorily this high pressure; of the possibility of a thrombosis of the bulbus venæ jugularis he was not so very certain. *Blaauu.*

Otitic Pyemia.

FREYTAG, MAGDEBURG, (*Archives of Otology*, VOL. xxxiii., No. 6.) CASE 1. Acute otitis media after measles. Empyema of the mastoid process on both sides. Osteophlebitic pyemia. Metastasis in the sterno-clavicular articulation.

As the pain complained of was in the right ear, the right mastoid was opened and cleared of pus and granulations. As the general symptoms persisted 4 days later the left mastoid was operated on and showed the same condition as on the right side.

The child's general improvement was now very striking. In a few days the sterno-clavicular involvement had disappeared.

CASE 2. A man, aged 36 was operated upon for chronic otitis media with polypi and caries in the attic and antrum. During the operation the sinus was exposed. Five days later there was high fever, severe headache, anorexia. On changing the dressing there was found at the region of the exposed sinus wall a small pulsating drop of pus. Elevated temperature persisted for a few days and then gradually receded. Three weeks later he complained of pains in the occiput corresponding to the course of the sinus. The sinus was exposed back-

wards as was also the dura covering the cerebellum but were found perfectly normal. There were no further disturbances.

CASE 3. A boy, aged 4, had a fetid otorrhea following scarlet fever, which according to experience in the ear clinic in Halle is important prognostically as evidencing a severe course of an aural suppuration. Even before the otorrhea, the left mastoid had become swollen and fluctuated. The left mastoid was opened and 6 days later the right was operated upon. The cells and antrum on both sides contained pus and granulations. As conditions did not improve and as there was evidence of bone necrosis in the left wound, 7 days after the primary operation the necrotic bone was removed and the sinus exposed. On opening the cranial cavity thick fetid pus was encountered and was followed by hemorrhage from the ruptured sinus. Packing speedily stopped this bleeding, the sinus and surrounding dura were covered by unhealthy granulation and pus, so the sinus wall was incised and soft thrombic masses removed until a free flow of blood came from the peripheral end.

As pressure on the neck some days later forced pus and thrombi out of the sinus the jugular was ligated. Still there had been sufficient absorption for fever and chills to persist for some days. *Campbell.*

Two Cases of Abscess of the Temporal Lobe of the Brain.

VOSS, RIGA (*Archives of Otology*, VOL. XXXIII., No. 6). Case 1. Three and a half weeks after a fall on the head with unconsciousness and hemorrhage from the left ear, that ear began to discharge copiously. Increase of pain suggested the presence of fracture of the base of the skull and it seemed that thus the ear had become infected. Operation revealed an extradural focus of granulation tissue and thus excluded the presence of a basal fracture. The temporary improvement was followed by high temperature and violent delirium. Autopsy later showed that in the exploration of the temporal lobe the scalpel had passed within 2 cm. of an abscess the size of a cherry in the lower part of the lobe. The surrounding parts of the brain were infiltrated and the abscess had perforated into the ventricle.

CASE 2. A boy with discharge from the right ear for 4 years was suddenly taken ill with violent headache, vomiting and fever. In a few days he felt so well that he returned to school. The headache however immediately recurred, localized in

the frontal region. No pain in the region of the ear. Temperature was normal, pulse 58 and irregular, eyelids edematous. On operation granulations were found in the antrum, the anvil was removed but no hammer could be found. The sinus appeared healthy. The long opening was enlarged so as to expose the dura of the cerebellum and of the temporal lobe. The temporal lobe was punctured with a syringe and an intensely fetid frothy, greenish-brown fluid withdrawn. After incision half a glass of the same fluid intermingled with gas escaped. From this time on there was steady progress towards recovery. *Campbell.*

Three Cases of Tumor of the Ear.

GERBER, KÖNIGSBERG (*Archives of Otology*, VOL. XXXIII., No. 6). *I. Fibroma.*—This tumor is interesting, not only on account of its localization but also on account of its size, it being as large as a plum and rising with a rather broad base directly below the helix and covering the anti-helix, the spine of the helix, the concha and the entrance of the auditory canal. There were no glandular swellings and it was enucleated under cocain anesthesia.

II. Tuberculoma.—An otherwise healthy girl, aged 20, had an enlargement of the left lobule since infancy which had gradually increased in size till it was the size of a small walnut. The consistency is that of a normal lobule. There was no glandular enlargement and the condition was considered as one of macrotia. Histologic examination showed a typical cutaneous tuberculosis with several giant-cell tubercles. Inoculation had probably taken place at the time of puncture of the lobule for an ear-ring.

III. Carcinoma.—A man, aged 40, with right-sided otorrhea since childhood. One year ago the right auditory canal swelled up and severe pain was experienced. An operation brought about improvement. One month ago a growth formed behind this ear, which has rapidly increased to the size of a fist. Hearing on the right side for ordinary voice is zero. Weber lateralized to the right. The external canal is filled with lobular, brownish granulation tissue. The auricle up to the thickened lobule is normal. There are a number of small hard cervical glands to be felt on the right side. A section removed from the auditory canal proved to be typical epithelioma. On operation a triangular defect in the bone was found, with its base towards the posterior auditory canal and the

apex directed towards the posterior cranial fossa, measuring 2 cm. horizontally and 3 cm. vertically. The antrum and surrounding cells are filled with granulations and pus, so likewise are the attic and tympanum. There are no ossicles. The posterior wall of the tympanum, the prominence of the horizontal semi-circular canal, and the facial nerve show normal conditions. After removal of the granulations the dura of the middle cranial fossa was exposed. A copious hemorrhage from the sinus precluded further operation.

Four months later the patient died of debility. All operation could hope for was a retarding influence upon the growth of the tumor. *Campbell.*

On the Statistics of Otitic Diseases of the Brain, Meninges and Cerebral Sinuses.

TAKABATAKE, NAGASAKI, Japan, (*Archives of Otology*, VOL. xxxiv., No. 1) publishes the results found in 54 consecutive cases in the ear clinic of University of Rostock. Thirty-four were uncomplicated if one disregards the slight changes in the external surface of the sigmoid sinus in perisinous abscess. Of the uncomplicated cases the extradural abscesses are the most frequent and of these, perisinous ones occurred 15 times while those in the middle fossa 7 times.

Of the complicated cases, the absence of meningitis serosa and the relative infrequency of brain abscess (two in the temporal lobe and two in the cerebellum) are striking features.

The old idea that chronic suppurations only led to intracranial complications is so far disproved, that in the 54 cases, the primary disease was acute in 30, chronic in 20 and of unknown duration in 4. *Campbell.*

Double Mastoiditis Followed by Diphtheritic Exudation (on the wounded surfaces) with Fatal Result.

HORLBECK, Columbia, S. C., (*Archives of Otology*, VOL. xxxiv., No. 1). A child, aged 4½ years, sick with measles developed purulent otitis media in both ears which was speedily followed by mastoid complications. On operation the cellular substance was broken down and filled with pus and granulations. On the left side was a small Bezold perforation of the inner plate.

Three days later both wounds were covered by a dense, dirty greenish pseudo-membrane which on cultural examina-

tion showed the presence of Klebs-Loeffler bacillli. The throat was congested but had no membranous deposit.

Three thousand units of antitoxin was administered but the patient failed to rally. No throat culture was taken but the case was probably a typical one of wound-diphtheria.

Campbell.

The Radical Operation in Chronic Middle-Ear Suppuration.

DENCH, New York (*Archives of Otology,* VOL. xxxiv., No. 1). During a period of 8 years, 14,487 cases of chronic and 4,836 of acute suppurative otitis media were under observation. Of these 218 suffered from severe intracranial complications. These records fail to show, but it is a well known fact, that intracranial involvement more frequently follows chronic suppuration.

While the simpler procedure of removal of the ossicles and curettment of tympanic cavity, is all that is required to relieve cases of middle ear suppuration in which the destruction of bone is limited to the ossicular chain, and to those parts of the tympanum easily reached through the meatus, the larger proportion of cases of middle ear suppurations demand the radical operation.

The complete radical operation requires:

1. The complete removal of the upper wall of the canal, so as to thoroughly expose the tympanic vault.

2. The removal of the posterior wall of the canal avoiding the facial nerve, carrying out this step so completely as to entirely obliterate the posterior tympanic space, that is that portion of the tympanic cavity which is hidden from view by the posterior wall of the external auditory meatus.

3. The obliteration of the hypotympanic space, by removal of the inner extremity of the inferior wall of the canal, in order to expose freely that part of the middle ear which lies below the level of the lower wall of the bony meatus.

4. A thorough curettage of the tympanic orifice of the Eustachian tube, to cause a complete closure of this channel, and to prevent reinfection of the tympanic cavity from this direction.

Of the cases operated upon in a large proportion the hearing was excellent—that is the whispered voice could be heard at a distance of 6 feet or over.

In none of the 98 cases operated upon was there permanent facial paralysis. In about 9% of cases there was some slight

interference with its function coming on from 2 to 6 days after the operation. In one case there was serious interference with the facial muscles for over one year but ultimately complete restoration of function took place. *Campbell.*

A Case of Chronic Purulent Otitis with Cholesteatoma and Numerous Endocranial Complications. Operation. Recovery. With Remarks upon the Diagnostic Value of Lumbar Puncture.

ARNOLD KNAPP, New York, (*Archives of Otology,* VOL. xxxiii., No. 6.) A congenitally syphilitic girl, aged 16, had suffered from double purulent otitis since an attack of scarlet fever at the age of 6. During the past year she had had pain in the left ear and vertigo. There suddenly developed chills, nausea and severe headache. The left canal was narrowed and filled with fetid pus, marked tenderness and swelling over the left mastoid.

Operation exacuated a subperiosteal abscess and a fistula was found leading into a large cavity, which occupied the entire mastoid process. The sinus and adjacent dura were bare and covered with granulations. The tympanum and inner portion of the external auditory canal were filled with cholesteatomata and granulations. There was a large defect in the external semicircular canal, which contained granulations. The tegmen antri was carious and on its removal pus escaped. The dura at that point was covered with apparently healthy granulations.

The wound was packed and kept open. Two weeks later a Panse meatoplasty was performed. As granulations had formed in the depth of the wound, these were subsequently curretted, the patient became very sick with high fever, delirium, rigidity of the neck and vomiting—all suggestive of meningitis. Lumbar puncture elicited a very turbid fluid but free of bacteria. From this time on patient gradually improved and was in apparently much better health than she had enjoyed in years. *Campbell.*

Two Cases of Tempero-Sphenoidal Abscess. Operation. Recovery.

LEWIS, New York (*Archives of Otology,* VOL. xxxiv., No. 1) Case I. That of a long standing purulent otitis media sinistra. After "grippe-like" symptoms for 5 days a severe chill was followed by an elevation of temperature up to 104° F. with violent left sided headache extending to the neck. Pyemic

symptoms developed, slight left facial paralysis and amnesic aphasia. Drowsiness with slow cerebration, tenderness over the antrum, tip and emissary vein.

On operation the incision was carried forward so as to expose the entire squamous plate of the temporal bone.

The antrum was filled with fetid cholesteatomatous material. The sinus was covered with pus and granulations. A probe could be passed through the tegmen tympani into the cranial cavity for some distance, on its removal a dram of fetid pus flowed out. The radical mastoid operation was completed, the whole of the squamosa and part of the anterior inferior angle of the parietal bone were removed. The exposed dura was blackish in spots and everywhere covered with lymph and bathed in pus. This extradural abscess covered the temporo-sphenoidal lobe. A scalpel was passed directly into the brain at this point and carried upward and forward for three quarters of an inch where it entered an abscess cavity about the size of a very large walnut. No irrigation; sterile gauze packing was employed. The facial paralysis quickly cleared up, aphasia gradually disappeared and the patient was discharged from the hospital at the end of two months.

Case II. was likewise one of long-continued otorrhea. Right ear pain, mastoid tenderness and excruciating headache localized above and in front of the auricle demanded a radical mastoid operation. The middle fossa was opened and the dura over the anterior portion of the tempero-sphenoidal found very tense and injected. The dura was incised and three ounces of fetid pus flowed out. For three weeks the progress towards recovery was so rapid that she was allowed to go home. Then she was found semi-comatose with a temperature of 106° F. The dura mater wound was reopened and from it pus spurted a distance of two feet. The abscess cavity was very large and extended well up into the frontal lobe. The supposition is that there were originally two abscesses and at the first operation the superficial one only was drained. *Campbell.*

Report of a Case of Tempero-Sphenoidal Abscess, with Streptococcus Infection. Operation and Recovery.

STEPHENS, New York (*Archives of Otology*, VOL. xxxiv., No. 1). The patient, aged 21, was admitted to the hospital suffering from an acute suppurative otitis media. The mt. was red and bulging especially in the anterior superior quadrant. General tenderness over the mastoid area. On para-

centesis the few drops of creamy pus showed abundance of streptococci in long chains. As he complained of persistent frontal headache and as the mastoid tenderness increased, three days after admission the mastoid was opened, and the entire cell structure removed. His general condition failed to improve. There was almost continuous frontal headache, the heavy coating of the tongue and fetor of the breath continued with anorexia and constipation. On several occasions pulse dropped to 60 per minute. On the 19th day after the mastoid operation he was somnolent; on being roused took nourishment and answered questions properly but cerebration was slow. He had a double choked disc. Next day he had projectile vomiting and optic neuritis had increased. The primary mastoid operation was converted into a radical one. The ossicles and granulations were curretted from the tympanum. The tegmen antri, the tegmen tympani and a portion of the squamosa were removed exposing an area of dura about the size of a half dollar. Granulations on the dura over the tegmen tympani were now observed. A bistoury was introduced through the area, upwards for three quarters of an inch. About three ounces of creamy, odorless pus was evacuated which contained streptococci only, in great abundance. A light wick of iodoform gauze was introduced into the abscess cavity for drainage. At subsequent dressings Whiting's encephaloscope enabled one to examine the cavity readily, to wipe away pus clinging to its walls and to re-introduce a gauze wick. The convalescent period was uneventful. *Campbell.*

Some Points Respecting the Surgical Anatomy of the Facial Nerve.

ALDERTON, Brooklyn (*Archives of Otology*, VOL. xxxiii., No. 6) after preparing a number of temporal bones,, injected the facial canals through the styloid-mastoid foramina with a boiling solution of carmine in beeswax. In each, two horizontal sections were made, one on a level with the spina supra-meatum, the other with the floor of the orifice of the external auditory canal.

In 18 bones, 9 dehiscences were found, in that part of the facial canal, bordering on the cavity of the middle ear; all of these were near the fenestra ovalis.

The author and Noltenius, in an examination of 40 bones, found an average distance of 15.7 mm. from the spina supra-meatum to the facial canal. The minimum distance was 11 mm.

The facial canal in its vertical portion is on an average 3.5 mm. from the nearest point of the posterior edge of the annulus tympanicus.

In none of the specimens did the injection escape from the aqueductus Fallopii into the internal auditory canal. Yet it did escape from the hiatus Fallopii into the middle cerebral fossa in seven of the specimens. This fact certainly indicates that the track of injection from the middle ear along the facial canal proceeds more readily towards the middle cranial fossa than towards the internal auditory canal and posterial cranial fossa *Campbell.*

Three Cases of Lateral Sinus Thrombosis.

LEWIS, New York (*Archives of Otology*, VOL. xyxiv., No. 1). Case I. A boy with fetid discharge from the right ear of three years' standing suddenly developed chilly sensations, severe headache and vomiting.

The mastoid was opened and the sinus down to the bulb exposed. Upon opening the sinus it was found to contain a greenish mass; the inner wall was necrotic and discolored and the adjacent cerebellum bulged. Upon puncture a free flow of serum was obtained. Cholesteatomata were removed from antrum and tympanum. On removal of the sinus clot, blood flowed freely from above but not from below. After packing the mastoid wound, the jugular vein was resected. Recovery was uneventful.

Case II. A man, aged 21, was seized with pain in the right ear, followed by rupture of the mt. and discharge. Seven days later because of insufficient drainage and mastoid tenderness a paracentesis was done, ice-coil and irrigation employed. During the next two weeks paracentesis was done a second and a third time; then the mastoid was explored and a cortical perforation leading down to an exposed sinus found. The sinus was bared from knee downward to the jugular bulb, it was covered with granulations and necrotic. The emissary vein was wounded. For 2 months there was apparently favorable progress, then the temperature ran up to 105.8° F. The mt. was congested and bulging and as a mastoid sinus persisted an exploratory operation was done, A little necrosed bone was found in the aditus ad antrum; the sinus was exposed and incised, free bleeding occurred from above but not from below until pressure was made on the neck. Forty-eight hours

later as the temperature remained high the internal jugular was resected and its wall found infected by streptococcus.

Facial erysipelas and septic pneumonia later developed. Then an abscess developed and was opened in the gulteal region. Against advice and with a daily rise of temperature to 99.4° F. he left the hospital and shortly afterwards died.

Case III. Was admitted in a semi-comatose condition. Temperature 104.5° F. The tissues over the mastoid were edematous and acutely sensitive to pressure. The upper and posterior auditory canal was sagging. On operation the mastoid was found so disintegrated that the sinus was exposed and found covered with a purulent exudate. The radical operation was completed and the sinus exposed from one inch back of the knee downward to the bulb. On its being incised a free hemorrhage occurred from the torcular end but none from the jugular end. The mastoid wound was packed, then the internal jugular was resected. The septic thrombus extended into the subclavian vein to an indeterminable extent. As the patient was in extremis further operative procedure was out of the question. Both inner and outer walls of the sinus contained enormous numbers of mixed micro-organisms.

Campbell.

The Palliative Treatment of Acute Mastoiditis and Its Limitations.

PHILIP HAMMOND (*Journal American Medical Association*, November 26, 1904). The question of the most appropriate time for surgical intervention is one in which experience must play a large part. Undoubtedly many of the cases which eventually recover when left to themselves contain pus, but this by no means should establish a precedent for allowing cases to go on without operation. Where tenderness of the mastoid exists for days, even in slight degree, with abundant purulent discharge from the ear, or where after once subsiding, the tenderness returns, operation is undoubtedly expedient, even if not absolutely necessary.

Under no circumstances should attempts at prevention of operation be continued where edema has already appeared in the region of the mastoid, as with this condition the amount of damage inside the bone may be merely conjectured, and surgical interference becomes imperative.

The paper is based on the study of fifty consecutive cases taken from hospital record during a period extending over six months.

Free incision of the drum was made in all cases where there was not sufficiently good opening. Rest in bed for the first day or so, the continuous use of the Leiter coil, cleansing of the auditory canal and attention to the alimentary tract comprised the treatment following the paracentesis.

Thirty resulted in recovery with disappearance of mastoid symptoms; seventeen came to operation during the stay in the hospital, and three patients who were discharged apparently relieved, subsequently returned for operation.

Mastoid tenderness in some degree was present in all but three of the cases. Some were very tender throughout the whole mastoid, while some exhibited simply localized tenderness on very firm pressure over the antrum or tip of the process.

The average time the cold coil was worn was slightly over 48 hours.

Acute purulent infection of the bone was found in all cases on which operation was performed, accompanied by granulation formation, and generally by softening of the bone.

Richards.

Two Cases of Cured Cerebellar Abscess.

FERDINAND ALT, Vienna, (*Monatsschrift für Ohrenheilkunde*, July, 1904). One was caused by an acute, the other by a chronic purulent inflammation of the middle ear. Both abscess cavities were closely related to the diseased bone, and connected with it through a fistula in the dura.

The first mentioned abscess was reached by following its fistula. After the method of Jansen, which is the removal of a part of the median wall of the antrum, and the bony structure between it and the transverse sinus, thus, the opening was between the semi-circular canal and median edge of the transverse sinus. The other abscess was reached after the method of Macewen, by making an opening back of the transverse sinus.

Neither case showed well defined symptoms of cerebellar abscess. The abscesses were found by following the fistula. Healing was complete.

Foster.

Otitic Brain Abscess. Report of Two Cases. Observations Concerning the Disease.

GEORGE F. KEIPER, Lafayette, Ind. In the first case the op-

eration was done for mastoid abscess without suspecting brain abscess. The patient was a housewife, aged 26. The bone beneath the mastoid cortex was very necrotic. After clearing away all the debris it was found that the tegmen antri was necrotic, and on removal, pus began to flow from the brain cavity. This cavity he explored with his little finger. It involved the temporo-sphenoidal lobe right over the tegmen antri. The cavity was dry-cleansed thoroughly and a decalcified bone drainage tube inserted. Temperature was 99°, pulse 150.

The wound was not dressed until the third day, when the tube was removed from the brain cavity. Its removal was followed by a gush of pus from the brain, relieving the headache. The drainage tube was obstructed. It was cleansed and replaced. The patient thereafter, whenever there was any obstruction to the flow of pus, complained of headache, which was relieved by cleaning the drainage tube. To keep the brain cavity clear of pus, he was compelled soon after to abandon all tubes for drainage and to rely upon wicks of sterile gauze introduced to the depth of the abscess cavity. Even then the wound in the dura mater attempted to close before the walls of the abscess cavity had grown together, necessitating enlarging the opening in the dura by artery forceps introduced closed and opened in the cavity and pulled out open, to tear the wound in the dura mater larger.

The after history was uneventful and recovery complete.

The second case, a man, aged 30, who, when first seen had had fifty convulsions during the previous twenty-four hours, and had been unconscious for forty-eight hours. There was a history showing involvement of the left mastoid process with recurrent purulent discharge from that ear, for a number of years. A few days before he had come home in a dazed condition, answering questions and talking incoherently. Examination of the ears was negative. An abscess of the left temporo-sphenoidal lobe was thought probable.

The left mastoid process was opened, found sclerosed. The opening was continued upward, uncovering the dura mater, which, on being incised, let out considerable fluid and flocculi of necrotic brain tissue. Exploration revealed no further trouble apparently. The next morning there were convulsions, and death occurred forty-eight hours later. Post-mortem examination showed a diffuse leptomeningitis. In the temporo-sphenoidal lobe was a cavity capable of holding three

or four drams of such matter as was removed during the operation. Search for multiple abscesses failed to reveal any.

Richards.

A New Means of Securing Permanent Dilation of the Eustachian Tube.

D. D. ACHSHARUMOW, Poltawa, (*Therapeutische Monatshefte*, translated by D. B. ST. JOHN ROOSA for the *Post-Graduate*, December, 1904.) "The air is blown into the tympanic cavity by means of a part of the ordinary apparatus used for spraying the nostrils or larynx. On the free end of the rubber tubing, a proper tip to fit the nostrils is inserted, and for convenience of use, the tube between the two air bags should be doubled in length by an intermediate piece. The patient who wishes to treat himself sits or stands before a table upon which the apparatus lies, having inserted the nose piece and closed the nostrils over it with two fingers of the left hand, *the mouth being open*, the procedure begins. Seizing the terminal air bag of the apparatus with the right hand, it is pressed together several times until the second air bag is sufficiently distended. This widens the opening to the Eustachian tube and the strong tension of air is felt in the inner ear. The opening of the tube and the membrane of the drum remains in this moderately dilated condition so long as the nose is hermetically closed, and the second air bag fulfills its function of not allowing the air to pass backward. The right hand is then pressed on the second air bag and pressure made with strokes that are light and quickly following each other, by which the opening of the tube is enlarged in spurts and the drum head put in vibration. This pressure must be made very rapidly at the rate of 150 times in a minute, perhaps more. When the nose is kept closed, the bag air tight, and the tension of the air moderate, these passive gymnastic exercises can be kept up on both structures as long as we like, but in general, in consequence of incomplete closure of the nostrils, the air bag becomes relaxed and must be filled again by a little pressure, consequently some minutes will be taken up. Each pressure of the hand, even the resting of the fingers on the second air bag causes the sensation of a light blow in the ear. This method constitutes a kind of vibratory massage of the affected portion, the walls of the opening of the Eustachian tube, the Eustachian tube itself and the membrana tympani."

Richards.

Suction as a Means of Treatment in Diseases of the Ear.

SOUDERMANN (*Archiv. für Ohrenheilkunde,* Vol. 64, Part I.) The author recommends its use in cases of both acute and chronic suppurative otitis and describes a new apparatus which he has invented for this purpose which is made in the form of a mask to fit over the external ear and so can be used without pain and by the patient at home. It should be used sufficiently often to keep all secretion out of the ear. An additional value therapeutically in the author's opinion is derived from the artificial hyperemia produced. A recent monograph by Bier on "Hyperemia as a therapeutic measure" is quoted in substantiation. The histories of a number of cases are given showing the benefit derived from the treatment. *Harris.*

Prophylaxis of Acute Otitis Media.

JUL. VEIS, Frankfort, (*Monatsschrift für Ohrenheilkunde,* Feby., 1904). The majority of men blow their noses by closing or partly closing both nasal orifices and forcing air through the nose, which often forces air and secretion, about the Eustachian orifice, into the tube and middle ear. The more secretion in the nose and naso-pharynx, the more force is used to remove it, and consequently the danger of carrying infectious material into the middle ear.

Text-books generally recommend blowing one side of the nose at a time by closing the other. This works well when the force is not too great and the two sides are nearly equal.

Veis advises the freeing of the nose from secretion by moderately blowing the nose, with a handkerchief held beneath and both nasal orifices open. *Foster.*

II.—NOSE AND ACCESSORY CAVITIES.

Comparison of Nose and Mouth Respiration.

PROF. ZWAARDEMAKER (*Netherlands Laryng., Rhin. and Otol. Society*) shows pictures on the screen relating to the movements of the respiratory apparatus and the currents which arise. The complete synchronism between the contraction of the diaphragm and the movements of the thoracic walls is demonstrated. Three air chambers connecting through narrow openings, are distinguished. The size of the naso-pharyn-

geal chamber is estimated at 90 c. cm., of the laryngo-tracheo-bronchial chamber during life at 100 c. cm.; the alevolar chamber is estimated to have a mean capacity of 2400 c. cm. The width of communicating openings, measured in the cadaver, is (a) for both nose openings 2 c. cm.; (b) for the glottis 0.75 c. cm.; (c) for the bronchi proceeding from the trunk-bronchi, which ramify dichotomically, 5 c. cm. This means for the reduced area of the nasal cavity 2x0.4 c. cm.=0.8 c. cm. (Gevers Leuven); for the reduced area of the glottis 0.5 c. cm.; for the reduced area of the bronchi, originating from the trunk-bronchi, 4.4 c. cm. Some new experimental methods, used for some months in the Utrecht laboratory, showed the following results: (1) the maximal velocity of the expiratory current is smaller than that of the inspiratory current. The first is on an average 1.2 m. a sec., the last 1.6 m. a sec. (in the trachea). (2) Moist warm air enlarges the superior air canals and augments both respiratory velocities (Gevers Leuven). (3) The velocity curve of the respiratory current is not a sloping zigzag line, similar to a pneumogram, but a curved one, as the section of the plaiting of a mob cap. (4) It shows large individual variations, 5 types of which are demonstrated (Ouwehand). (5) The medium respiratory volume, reduced to 0.0 c. and 760 m. m. Hg., is 503 c. cm. (6) It is larger with oro-nasal than with nasal respiration alone.

The advantage of nasal respiration will be found (a) theoretically in the philogenesis (the development from a condition with separate chamber of the lower animals, wherewith it became possible to join the organ of smell with the respiration in air breathing animals). (b) clinically in the protection against temperature, dust, microbes. (c) mechanically in the assurance of an axial current in each one of the air chambers, (demonstrated empirically for the nasal cavity by the experiments of Paulsen, Zwaardemaker and Franke, for the pharyngeal and tracheal chambers by experiments on a model). The air in the air chambers is at rest around this axial current or is moved in fixed ways through vortices always present in it.

Dr. Posthumus Meyjes asked how these experiments were controlled. Prof. Zwaardemaker answered that the experiments were made with doctors, assistants or officials of the laboratory. Dr. Gevers Leuven experimented also with strangers and compared nose and mouth with the air-bridge. The distribution of the air in the nose and mouth showed great

variation. A nearly equal passage is found for normal persons in the recumbent position.

Dr. Van Leyden wondered that Gevers Leuven found an enlargement of the nose in warm air; it does not tally with the sense of oppression one gets in a hothouse. Prof. Zwaardemaker did not know how to account for it, but the fact is true, as well for men, as for rabbits.

Dr. Burger could not agree, that these experiments demonstrate that the importance of the nasal breathing should be to assure the supply of a large quantity of air. The voluntary mouth breathing in the laboratory can not be placed on a par with the pathologic mouth breathing of adenoid patients. Prof. Zwaardemaker showed that a quiet respiration through the mouth in normal persons supplies the wants as well as a quiet nasal respiration. Of course the condition changes if the base of the tongue drops backward in sleep. These experiments do not settle this question.

Dr. Struycken asked what is the normal measure of the nose, on account of the advice not to make the nose too open. Doubtless a very open nose is very agreeable with emphysema, asthma, etc.—Dr. Gevers Leuven found an area of twice 30 mm. after examining 33 persons; which agrees pretty well with Kayser, who found an area of 40 mm. for healthy nasal cavities. For normal people therefore, 30 mm. on each side will be sufficient.—Dr. Struycken stated that the persons were examined while resting, but that a wider passage would be necessary after exertion. Dr. Burger said, that these experiments give no image of pathologic conditions, because the soft palate is lifted with voluntary respiration, although in unknown measure. Prof. Zwaardemaker stated that normal persons were examined, who dispose, in repose, of a certain surplus; Burger's objection was true, but the raising of the palate must not be considered too important; Gevers Leuven respired, lying on a bench, through the mouth for half an hour and longer without being troubled by the continuously lifted uvula.

Blaauw.

Results of the Paraffin Treatment of Ozena Patients.

Dr. P. J. Zaalberg (*Netherlands Laryng., Rhin. and Otol. Society*) treated 60 patients during the last year (since September); although the results are very recent, he believes that he will not be disappointed in the future. Twenty are cured, 35 very much better, 5 remained the same or have disappeared.

A case is cured when the fetor has disappeared and crust formation stopped. Amelioration means an occasional slight return of fetor, with little secretion, which can be controlled by nasal cleaning every 1, 2 or 3 days; the crust formation is here minimum. The failure is the consequence of the almost complete disappearance of the conchæ, which prevents injection, as the treatment of the septum gives no results. The results speak against Gruenwald's theory that ozena is nearly always caused by suppuration of the cavities. He had a couple of cases with suppuration of the ethmoid, where the paraffin injections made the ozena symptoms disappear, while the suppuration remained unchanged. His syringe is a simple one of metal, the canulæ long and thick, with a curvature at the end, which makes injection easier. He injects in the posterior part of the inferior concha after cocainization; the middle concha is also treated. The number of injections changes, sometimes in one sitting both conchæ can be injected, sometimes they must be repeaed 8 to 10 times. The injections are usually painless; the nasal surroundings are often swollen during the next few days, which is painful, and there is lachrymation if it is injected too far forward; these symptoms pass without consequences.

Dr. Burger treated 6 patients (5 women). The atrophy of the nasal mucous membrane was very considerable. The technic in these cases is difficult. The great resistance under the mucous membrane may make the injection impossible. Burger saw the paraffin escape along the needle; it also might happen that the needle perforates the mucous membrane and the paraffin is deposited in the nasal cavity; the form of the inferior concha may make it difficult, so that only the anterior part can be injected, but if a deposit is made here, a later injection is still more difficult. Injections, which succeeded, often were followed by reactions, e. g. pain in the nose, swelling of cheek and eyelids on the side of the injection, pain in the eye, hemicrania and lachrymation. These symptoms appeared on the day of injection or on the next day; in one case patient recovered only after 14 days. His results were very poor. Some found the secretion lessened after one or a few injections, but as the patients used nose washes at home, not too much reliance should be placed upon this, because these favorable reports did not continue. Burger saw no cure nor amelioration in his 6 cases; he concludes that the far advanced atrophy of the mucous membrane was the cause, and therefore will take

milder cases, because it is demonstrated that the treatment is of no value in the severe cases of ozena. He injected paraffin, melting point 45°, at a temperature of 55°, with the syringe of Broeckært or of Delacre. Affections of the nasal cavities were excluded as much as possible, in 4 cases by proof puncture of the antra.

Dr. Broeckært distinguished 3 kinds of ozena: the light cases, with slight atrophy limited to the inferior conchæ, curable with 1, 2, 3 injections. In the average severe cases, a subjective amelioration always was perceptible. In the severe cases, the injection is useless and even dangerous, because much force must be used. A complication in one of 20 cases is thrombo-phlebitis of the facial vein, which can not be prevented and sometimes lasts two months. He advises not to inject too much paraffin at once, nor to use high pressure, nor to use paraffin warmer than 55°, always to inject first in the posterior part of the concha. Dr. Struycken had cures in 10-20% with injections of ordinary vaselin under the mucous membrance, one drop daily. The nose stays open but the symptoms of the ozena disappear. He saw no harm; he does not warm the vaselin, rather cools it. Dr. Moll saw in one case cure after 4 injections. Dr. Frederikse believed, in opposition to Zaalberg, that a suppuration of one of the cavities is often the cause of the ozena. One of the patients, demonstrated by Zaalberg, noticed for the first ozena symptoms, in his 18th year, that he smelled the fetor himself and relates that the secretion was chiefly one-sided. Frederikse supposed there was affection of one of the cavities. Another demonstrated patient says she uses only two handkerchiefs during the week, which argues against ozena. Dr. Zaalberg mentioned, in reply to Dr. Baeza, the examinations made by Doebeli (Archiv. f. Lar. B. 15) showing easy wandering through the cells of the mucous membrane in ozena, and thought that the paraffin injections change the nature of the mucous membrane.

Blaau.

Transillumination of the Frontal Sinuses.

CLAUS (*Archiv. für Laryngologie und Rhinologie,* Vol. xiii., No. 1) has examined frontal sinuses from 117 cadavers, both by the method of Voltolini, and by the more recent one of Arthur Meyer. He found both methods to agree fairly well with each other, but to possess no constant certainty in regard to the condition of the interior of the sinuses. For this reason,

he assigns a subordinate positon to diagnosis by transillumination of the frontal sinuses, except where employed in connection with the method of air inflation, as suggested by Bresgen, where the latter results positively. If, for instance, a frontal sinus before inflation, appears dark by transillumination, and subsequently lights up, one may say, with reasonable certainty, that empyema exists. If, however, it remains dark after inflation, it is, in the first place, possible that air has not entered the sinus; secondly, the opacity may be due to a tumor, to absence or the small size of the sinus, or, as more frequently occurs, may be dependent upon the thickness of the bones. It is also possible that large ethmoidal cells, situated far forward, may occur in the frontal sinus, which may be illuminated, while the sinus itself, situated posteriorly, may be diseased. The writer recommends especially the employment of illumination after the air douche, in connection with subjective perception of light, during convalescence from acute inflammation.

Goodale.

The Pathologic Anatomy of Hypertrophy of the Lower Turbinate.

CITELLI, S., Turin, (*Archives für Laryng. und Rhinol.*, VOL. xiii., No. 1.)

Hyperplasia and hypertrophy of the lower turbinates are results of chronic inflammation, extending from the surface into the deeper tissues. All the structures of the turbinate, including bone, are more or less involved. The hyperplasia of the connective tissue passes eventually into a process of degeneration. The degeneration in such cases is not mucous or colloid, but consists in the formation of cysts, and is to a certain extent of hyaline nature. The different forms of hyperplasia and hypertrophy may be divided into four types: first, mixed, or fibro-angio-adenomatous; second,. angiomatous. third, fibromatous; fourth, cystic or degenerative. Of these four microscopic forms, the two first correspond macroscopically to the diffuse hypertrophy, the third form to the papillary, and the fourth to the polypoid or degenerative type.

Goodale.

Bony Cysts in the Middle Turbinate.

HARMER, (*Archiv. für Laryng. und Rhinol.*, Vol. xiii., No. 2.) Bony cysts of the middle turbinate are somewhat uncommon, and are to be considered as a developmental

anomaly of the middle turbinate, probably congenital. Inflammatory irritations do not give rise to the cavities. The term "bony cyst" is to be employed only when the turbinate shows a distinct cystic expansion, not in all cases where a cell is found in the middle turbinate. The lining mucous membrane possesses a ciliated epithelium, is very thin and tender, contains a small number of mucous glands, and is usually loosely attached to the underlying bone. It shows therefore, close resemblance to the lining of the accessory sinuses, especially the ethmoid. Increase in size of the bony cysts is found usually only in a very slight degree, and is apparently not dependent upon inflammation, or polyp formation in the middle turbinate. The lining mucous membrane is usually free from inflammatory alterations. These conditions are to be distinguished from others, characterized by infection of the sinus and purulent secretion with closure of the channel of exit, under which circumstances, the bony cyst may exhibit rapid growth, dependent upon pressure from pus. These swellings are to be regarded as pathologic structures, distinct from the true bony cysts. The so-called mucocele of the middle turbinate is to be included in the same class as bony cysts. They show usually no material increase in size, except in the event of inflammation and stasis of their secretion, when they have the same pathologic significance as the empyema cysts. *Goodale.*

The Present Status of the Ozena Question.

GRUENWALD, (*Archiv. für Laryng. und Rhinol.*, Vol. xiii., No. 2). A number of focal suppurations (accessory sinuses, nasal passages and adenoid tissue in the epi- and mesopharynx) occur with the clinical picture of fetid crust formation in broad noses. The secretion is usually thin, generally without odor, at times, however, fetid in its fresh state, dries as a result of mechanical influences, especially through its adhesiveness, produced by infection with the bacillus mucosus of Abel, increased by the abnormal breadth of the nose. Atrophy, if not primary, arises through pressure, and the infectious influence of the crusts. The odor arises by saprophytic decomposition of the masses of secretion, kept in a half-moist condition by the abnormal adhesiveness. Whether the more serious character increases the tendency of the secretion to adherance and decomposition, remains to be determined. It is certain that general impairment of strength, depending on heredi-

tary causes, especially in family tuberculosis, favors the development of the initial focal suppuration, as well as the secondary processes of infection. The disease may also lead to general cachexia. *Goodale.*

Deviations of the Nasal Septum. A Review of One Hundred Operations for Correction.

JOSEPH S. GIBB, Philadelphia, (*Journal American Medical Association,* Oct 29, 1904). Of the 100 cases 65 were treated by the Asch method, 23 by the Watson-Gleason operation, and 12 were spurs.

Of the Ash operations results were good in 47 cases, fair in 11, and 3 were failures.

Of the Watson-Gleason operations the result was good in 19, fair results were obtained in 3.

The author concludes there is no single operation suitable for all cases of deviation of the nasal septum. Each case must be a study unto itself, and the surgeon must decide the operative measure best suited to the individual case. The Asch operation is satisfactory in the large number of cases in which the cartilaginous septum alone is deflected. Osseous deviation and cartilagino-osseous deviations are not suitable for correction by the Asch method. Deviations of both the cartilaginous and osseous septum offer the most difficult problem to solve, and no one operation meets every indication, but in many cases the Watson-Gleason operation, modified to suit the case, offers a good chance for success. Many cases of removal of spurs, either cartilaginous or bony, will accomplish the best result, and when this is the case, it is more desirable than the more formidable division of the septum. There are a certain number of cases which are inoperable. Perforations occur in about the same number of cases in all operations in which an entire division of the tissues of the septum is effected.

Richards.

The Formation of Cysts in the Cartilages of the Nose.

ZARNIKO, (*Archives Internationales de Laryngologie,* Jan., Feb., 1905). The report of a cyst in the nose of a man of 61 years, which had existed for 20 years. There was no pain complained of, but marked facial deformity. Puncture with a fine trochar evacuated a considerable quantity of brownish transparent serum and caused an immediate disappearance of the tumor for five months, when the puncture was repeated.

The cyst subsequently refilled but the patient refused all radical measures for its cure. The affection is an exceedingly rare one. The author dicusses the method of formation. He does not believe they are of the nature of retention gland cysts but arise in the cartilage, corresponding in effect to the serous perichondritis of Velpeau. The affection of the mucosa is then to be considered only an occasional cause, produced upon a cartilage predisposed to cyst formation.

Nasal Reflex.

L. Rethi, Vienna, (*Monatsschrift für Ohrenheilkunde*, Jan., 1904) reports three cases of reflex nervousness, following an intranasal operation, in which tampons were used. The symptoms disappeared after the removal of the tampons.

Male, 25 years old. Purulent sinusitis, left nasal cavity. Sphenoid and frontal sinuses not involved. The anterior half of the middle turbinate was removed, the ethmoid cells were opened, and the nasal cavity packed. The patient was sent home. When he returned the following morning, he stated, that about two hours after the operation, he had a heavy feeling in one of his legs, which continued to the present time. On removal of the tampon the condition in the leg disappeared.

Female, 20 years old, with hypertrophied left inferior turbinate. The inferior turbinate was removed, the nose packed, and patient sent home. On the following day she returned and reported that she was uncertain in her movements, at times was dizzy and tottered when she walked. When the packing was removed the symptoms all vanished.

Male, 30 years of age, with marked hypertrophy of the middle turbinate. Middle turbinate was removed and nose packed. The patient walked home. About twenty minutes before he reached his home he became very dizzy. This dizziness continued to the next day, when he returned. It was present whether lying or sitting. About two minutes after the removal of the packing the head became free, the dizziness disappeared and patient could walk perfectly well.

The nasal lymphatic system is directly connected with that of the subdural and subarachnoid. It is possible that the above mentioned reflexes are due to an interference with the lymph and blood flow from the pressure of the intranasal packing. *Foster.*

Postoperative Nasal Hemorrhage; Calcium Chlorid; Secondary Anemia; Rapid Recovery.

REYNOLD WEBB WILCOX, New York, (*American Medicine*, March 18, 1905.) The patient, a man of 25, was operated on July 8, 1904, by Dr. Frank E. Miller, the inferior half of the right middle turbinate, together with a small spur, being removed with snare and saw. Cocain and adrenalin chlorid were used. The healing was uneventful until the evening of the fourth day when profuse hemorrhage came from the right nostril. This hemorrhage continued at varying times in spite of repeated packings until July 20. In the meantime the patient became very anemic. The temperature on the second day of the bleeding went to 104.4°.

The case is reported particularly in regard to the treatment, which consisted of calcium chlorid 40 grains, given by the rectum after free hemorrhage. Adrenalin chlorid, morphin and ergotin were also used. Convalescence was established by July 25. Plugs were continued in the nose for nine days, the 12th to the 21st.

The calcium chlorid is used because it causes the blood to coagulate more rapidly, and often causes an arrest of hemorrhage. Its continued administration, however, is not effectual in keeping up a permanent condition of increased coagulability of the blood. The dose, 40 grains, either by mouth or rectum, given once daily will accomplish what is desired. For the relief of the anemia, iron-vitellin was given with good results.

Richards.

Remarks on Some Abuses in the Intranasal Surgery of To-day.

MACKENZIE (New York *Med. Jour.* and Philadelphia *Med. Journal*, Jan. 28, 1905.) A strong plea against the indiscriminate surgery of the nose and throat at present. Many operations on the nose are unnecessary unless the irregularity on the septum is of such a character as to cause serious obstruction and thereby cripple function. Most spurs met with are perfectly harmless. Small spurs may be actually productive of good to the individual. The author recommends as a substitute in suitable cases for operation upon the septum itself, removal of portion of the external and notably the inferior turbinated bone of the obstructed side (or portions thereof). Wholesale removal of the turbinated bodies is to be deprecated. Puncture of the antral wall is not always essential to a diagnosis of antrum disease and is capable of causing harm. It

should be followed by immediate operation where disease is found. The ground of all this reckless surgery rests in ignorance based on insufficient preliminary education. The time has come for a higher education of the student of laryngology. No short course of six weeks can possibly do this. *Harris.*

A Method of Demonstrating the Passage of Air Through the Nasal Fossae.

GLATZEL, LIEGNITZ (*Monatsschrift für Ohrenheilkunde,* January, 1904) uses rectangular mirrors, made of nickel plated sheets of zinc. On the sides of the mirrors are two projections which are used as handles. On each end there is a small piece of the mirror cut out to fit the upper lip. From this edge to the center of the mirror there are scratched upon the surface four arcs of a circle, at equal intervals, to enable the recording of the results. A mirror so constructed has four surfaces for exposure without cleaning.

The person to be examined removes any secretion in the nasal cavities by blowing one side at a time. A tight collar, or shirt band, interfering with the circulation of the neck, and thus the circulation of the turbinates, should be loosened. The mouth should be closed in a natural way and deep inspiration and expiration begun. During inspiration the mirror is placed in a horizontal position with the cut-out part a little above the middle of the upper lip. During expiration moisture will collect on the mirror, like the wings of a butterfly. The expiration through a normal nose will produce two symmetrical cloudings of the mirror, extending to or beyond the fourth arc, and lasting from two to three minutes. If the clouding made by one nasal cavity is smaller than the other, or disappears more rapidly, then the patency of that side is less than the other. If the clouding extends to, or only a little beyond, the first arc, or is thin and disappears rapidly, then there is an obstruction to expiration on both sides of the nose; as in cases with adenoids, or when the septum is transversely placed from trauma.

Foster.

III.—PHARYNX AND MOUTH.

Hemorrhages after Adenotomy and Tonsillotomy.

P. TH. KAN (*Netherlands Larnyg., Rhin. and Otol. Soci-*

ety) observed three cases of hemorrhage after tonsillotomy, so serious that it was necessary to use Mikulicz' compressor; one patient bled from both tonsils, so that two compressors were necessary; in one case a secondary hemorrhage occurred 13 days after removal of the compressor, but stopped spontaneously. Only a slight edema of the uvula and palate and a quickly passing paresis of one of the branches of the facial nerve were the consequences of the instrument. Kan prefers this way over the method of Heermann, in the presence of strong reflex motions. Kan also had three hemorrhages after adenotomy, which necessitated tamponing the naso-pharyngeal cavity. In one case the hemorrhage occurred directly after the operation, in one case two and in the third case six days after the operation. Five were private cases, and all in good physical condition. He prefers the tonsillotome for small, restless children.

Dr. Posthumus Meyjes warned against the use of instruments that are too sharp; he performs tonsillotomy with the cold snare with much success and considers the slow cutting off as of advantage on account of lessened danger of hemorrhage.

Dr. Mulder thought it better not to gargle after these operations.

Dr. Moll recommended Ruault's forceps for tonsillotimy.

Dr. Kan found that these frighten children on account of their size. *Blaauu.*

Swelling of the Cervial Glands in Affections of the Pharynx.

STRUYCKEN (*Netherlands Laryng., Rhin. and Otol. Society*) treated in detail the swelling of the lymph glands, which are found accompanying the most different affections of the head, and gave some typical examples; bilateral excessive glandular tumors develop quickly with malignant tumors of the pharynx, while often the primary tumor is small and does not ulcerate; moderately enlarged glands around the jugularis ex- and interna, often also in the neck, are found with inflammation of the naso-pharynx; the glands in the posterior wall of the pharynx are swollen only exceptionally. A pronounced swelling of these glands can be found with sphenoiditis, caries of the cervical vertebræ and deep malignant tumors. A painful swelling of the glands, which accompany the sheath of the large vessels, is often found with the diplococci angina, which is very painful, and shows only a trifling, circumscribed redness of the faucial mucous membrane; this affection re-

mains not seldom subacute, and gives rise to intermittent rise of temperature while the connective tissue and the muscles around the glands are infiltrated; these glands are often softened in the center and contain a pure culture of diplococci. They can cause edema glottidis, and also vagus death. Struycken treated a few such cases, surgically.

Blaauu.

Angina and Phlegmonous Pharyngitis, Followed by Purulent Thrombosis of the Cavernous Sinus and Purulent Basillar Meningitis.

TOLLENS, Breslau, (*Archives of Otology,* VOL. xxxiii., No. 6.) This is a case of that which Senator first described as acute infectious abscess of the pharynx. A young woman was taken suddenly ill with high fever, a pain in the neck, difficulty in swallowing and severe headache. The right cheek presented a striking red swelling extending to the upper margin of the zygomatic arch and back to behind the right ear. Right catarrhal conjunctivitis. Pupils uniform and react readily. The pharynx is intensely red, without exudate. The right half of the soft palate is swollen and red but without fluctuation as is likewise the post-pharyngeal wall. The glands at the angle of the jaw are enlarged. The soft palate was incised without result. All symptoms were aggravated next day. Protrusion of the right eye ball with chemosis. The right pupil was larger than the left, but both reacted promptly. Two days later protrusion of both eyes and chemosis of both conjunctivæ. The swelling of the right side of the face has increased. The tip of the right mastoid is tender as well as the region of the emissary vein. The palate wound discharges thick pus containing streptococci in pure culture. The pharyngeal wall was incised without producing pus. Pronounced meningitis symptoms developed and patient died of general septicemia.

On autopsy the blood vessels of the pia on the convexity of the brain were congested. There was purulent basal meningitis. The cavernous sinus was thrombosed and the Gasserian ganglion surrounded by a purulent fluid. The right tonsil was as large as a walnut and soft on pressure. The mucous membrane of the tongue, pharynx and epiglottis was covered by a blackish-green exudate. There were small abscesses in the apices of the lungs. In the kidneys were many septic emboli.

The purulent inflammation presumably extended along the

delicate veins, which pass from the venous pharyngeal plexus through the base of the skull to the cavernous sinus.

Campbell.

The Cryptic Structures of the Hyperplastic Pharyngeal Tonsil.

GOERKE, B. M., Breslau, (*Archiv. für Laryng. und Rhinol.*, VOL. xiii., No. 1.) The formation of cysts in hypertrophied pharyngeal tonsils is frequently observed, and occurs more often in adults than in children. The anatomic structure of the cysts and their contents, vary with their origin and their situation. Such cysts arise usually through retention of the glandular secretion, and the times also as a result of other processes, such as extravasation of lymph into the glandular ducts, together with processes of proliferation and growth in their walls. These processes are the result of inflammatory conditions. *Goodale.*

Adenoid Cachexia.

I. Examination of the blood in children before and after the removal of adenoid vegetations.

II. Does cyclic albuminuria frequently occur in children with adenoid vegetations.

TAKABATAKE, Nagasaki, Japan, (*Archives of Otology*, VOL. xxxiv., No. 1.) Author selected the 28th day after the operation to make the second blood examinations in a series of 50 children.

In 12 cases the quantity of hemoglobin was increased.

In 8 only there was an increase of red blood corpuscles.

In 4 a diminution.

The number of white blood corpuscles in all cases diminished after operation.

The polynuclear and the eosinophile cells were slightly increased, while the large mononuclear cells and the lymphocytes were diminished.

The general physical condition and body-weight increased except in one case which remained stationary.

II. Cyclic albuminuria occurs in children and youthful individuals of feeble constitution and retarded development more frequently in proportion with increase of other symptoms of feeble health; viz.: chlorosis, scrofula and dilated heart.

As adenoid children are usually feeble it seemed well to examine the urine in this series of 50.

Albumin was found present in only one and this did not

occur again after rest or after moving about. Cyclic albuminuria in the urine of otherwise healthy individuals occurs chiefly during the day and disappears on rest in bed at night.

The one positive case of the author shows such a slight percentage that its occurrence may be regarded as purely accidental. *Campbell.*

Cartilage in the Pharyngeal Tonsil.

E. ZUCKERKANDL, (*Monatsschrift für Ohrenheilkunde*, Feby., 1904,) refers to the article by Reitmann regarding the presence of cartilage in the connective tissue of the faucial tonsils, and says that cartilage also occurs in the connective tissue of the pharyngeal tonsils.

He reports his findings in a pharyngeal tonsil removed from a lion. After hardening the tonsil was 4 mm. thick. It was composed of three layers—a superficial layer of adenoid tissue, a deep layer of connective tissue, and between them a glandular layer. The cartilage masses were irregular in shape, hyalin in character, surrounded with a perichondrium, and located in the glandular layer. The occurance of cartilage in the pharyngeal tonsils of lions is not a usual thing. *Foster.*

Lithemic Nasopharyngitis Due to Systemic Disturbance.

J. A. STUCKY, Lexington, Ky., (*Journal American Medical Association*, Oct. 15, 1904.) By this term is meant that type of disorder having a close etiologic relationship to rheumatism, or the so-called lithemic diathesis, and has its origin in autointoxication caused by the absorption of by-products from the intestinal tract, or in the faulty metabolism occurring in the liver.

It may be defined as an acute congestive rather than an inflammatory process.

In these cases there is local manifestation of a systemic condition. The patient complains of always taking cold, sneezing, having a stuffy, full feeling in the head, one nostril always stopped up, copious and frequent discharge from the nose, greatly annoyed by accumulation behind the palate and crackling noise in the ear. In addition to these nasal symptoms, attention will be called to a stiffness in the throat, sensation of a foreign body. They complain of "catarrh."

Interrogation reveals that more or less constipation exists, that little water is drunk, that meats and sweets are freely

used, the skin is abnormally florid or muddy, and that there is an increase of indican in the urine.

There is no permanent relief until the treatment thoroughly eliminates the indican and the insufficient functioning of the large and small intestine is remedied and improper diet corrected. The gastric contents should be analyzed to see whether the stomach is at fault. Many of these cases have naso pharyngeal annoyance either immediately or several hours after eating. If immediately, we suspect the trouble to be reflex gastric irritation; if several hours after, intestinal toxemia, due to indigestion.

The author regards local treatment as of little value except as a preliminary cleansing of the mucus. The first indication is to clean out the alimentary canal. The patient is put on restricted diet and plenty of water, an average of six ounces every hour. A dose of calomel and salol five or ten grains each is given, followed in six hours by a saline.

An hour before the evening meal the colon is filled and flushed with two or three quarts of soapsuds, by means of a thirty-inch double-eyed colon tube. Three or four hours later, eight ounces of warm olive oil are injected by means of an injector consisting of an ordinary nursing bottle with two openings, one at the top and one at the bottom. In the lower opening a suitable conical tube about 14 inches long is inserted full length. The upper opening is fitted with a perforated stopper containing a small tube, to which is attached an ordinary atomizer bulb.

This treatment is given four or five days continuously, then once or twice a week, marked relief being observed in the majority of cases. That the patient has one or more evacuations of the bowels daily does not prove the absence of retained toxic fecal matter. The effect of the colon flushings and oil treatment is: 1, mechanical, by softening of the scybalous masses; 2, the oil is broken up into fatty acids and glycerin, the absorption of the glycerin causing watery flow of bile from the liver.

Mild cases of lithemic naso pharyngeal irritation can be relieved by alkaline cathartics. *Richards.*

Stenosis of the Nasopharynx Secondary to too Strenuous Curetting for the Removal of the Adenoid Vegetations.

ESCAT, (*Arch. Int. de Laryng.*, Jan., Feb., 1905). Report of a case where some months previously a local practitioner had

operated without an anesthetic and apparently curetted all four sides of the pharynx. The operation was followed by much pain for three weeks. When seen by Escat, there was great difficulty in breathing through the nose and decided deafness. Examination of the pharynx revealed almost complete adhesion of the soft palate, a fine probe discovered a sinus leading to the naso pharynx.

Five months were required to permanently separate the walls, the author employing for this purpose a curved hook, under cocain. The adenoid growth lying attached to the vault was found untouched. The result as to hearing and breathing was good. Warning is given as to the dangers attending indiscriminate adenectomies at the hands of inexperienced men, not specialists, and the importance of care and skill in the performance of the operation emphasized.

Operative Treatment of the Faucial Tonsils, with a View to the Prevention of Cervical Adenitis.

ROBERT C. MYLES, New York City, (*Journal American Medical Association*, Oct. 29, 1904.) The author thinks that the cervical lymph nodes can be read with the fingers and may be considered as an index to pathologic conditions in the faucial tonsils; that rheumatism, septic infection, tuberculosis and the like may be traced to primary involvement of the tonsil, the microbes invading the tonsil through the crypts. The enlargement and surface irregularities associated with chronic hypertrophy greatly favor infection.

We should not be contended with the old method of tonsillectomy with the guillotine only, but should employ scissors, dissecting knives, traction forceps, wire snare, punch forceps or curette, each or all, as careful analysis may indicate in each individual case. *Richards.*

Spontaneous Tonsillar Hemorrhage.

LEWIS S. SOMERS, Philadelphia, (*Journal American Medical Association*, Oct. 15, 1904) reports a case of spontaneous tonsillar hemorrhage in a woman aged 71 years, who had been ill for a week with peritonsillar abscess of the left side. This was her first attack. The abscess had discharged profusely two days previously. Dr. Somers was called at midnight for the first time, when the nurse said the patient was bleeding to death. She had suffered during the evening from great pain in the throat, and a few minutes before he was summoned,

was heard by the nurse groaning and strangling. It was then found that a column of blood was pouring from the mouth, a large basin being soon filled with bright arterial blood. The patient's clothing and bedclothes were soon covered with it, and a stream was still gushing from the mouth.

As forcible pressure as possible was made over the carotid artery of that side, but it was impossible to obtain proper illumination and so ascertain the vessels involved in the bleeding. With the unengaged hand forcible pressure was made by means of two fingers over the tonsil, compressing the pillars together, while a saturated solution of tannic acid was poured into the mouth, the hemorrhage diminishing sufficiently in amount to allow of this procedure. Strychnin and ergot were administered internally, and within fifteen minutes the hemorrhage had practically ceased. Fifteen minutes later the hemorrhage had entirely ceased and there seemed to be no further immediate danger.

Examination later showed that the abscess had destroyed the entire tonsil and in this way had involved several small vessels, while the main volume of blood was evidently derived from the artery of the anterior pillar of the fauces, through which there was a large ragged opening. No further bleeding took place. *Richards.*

Sarcoma of the Tonsil.

J. COLLINS WARREN, Boston, Mass., (*Boston Medical and Surgical Journal,* March 9, 1905.) The tumor was on the right tonsil, about the size of a fist, and occurred in a woman 33 years of age, with a history of growth of three years' duration, much more rapid during the previous six months.

She was operated on January 5, 1904. An incision was made from the outer angle of the mouth vertically downward to the edge of the chin, whence it was directed backward at a sharp angle reaching to the level of the external auditory meatus. The cheek was then separated from the lower jaw and held back with a tenaculum. A blunt dissector freed the lower surface of the horizontal portion of the jaw from the soft parts; the bone was then divided a short distance in front of the ascending ramus with cutting forceps working in a groove made with a saw. Single hooks fastened into the cut ends of the bones were used to separate the fragments widely by dislocating the heads of the jaw from their sockets.

The tumor was found on inspection to be closely attached to

the thyroid cartilage. It was not difficult to shell it out from above, but its connection with the larynx necessitated the removal of the epiglottis and a portion of the glottis on the right side. The larynx was so much loosened from its connections by this incision that it had to be stitched to an opening in the wound and thus made fast to the edges of skin in the anterior portion of the wound in the neck. Fragments of the jaw were wired together and the wound closed with drainage from the floor of the mouth.

The patient made a good recovery and left the hospital on February 18. On June 13, a fragment of necrosed bone was removed from the neighborhood of the wire suture—the bone itself having firmly united. On November 7, the patient came again to the hospital to have the opening in the neck closed. This was about one and one-half inches in length, and during phonation the vocal cords were exposed and could be seen in motion close to the surface. The edges of the wound were refreshed under cocain anesthesia and two rows of sutures taken—one of catgut for the mucous membrane and one of silkworm gut for the skin. There was prompt healing by first intention. There had previously been some leakage through this opening during deglutition, but after this wound was healed, deglutition was performed without difficulty. The patient's health now appears to be all that can be desired, and inspection of the fauces shows no recurrence.

Pathologic examination showed the tumor to be a small round celled sarcoma, about half the size of a fist.

Richards.

Report of a Case of Acute Septic Inflammation of the Throat and Neck, in which the Edematous Swellings were Dispersed by the Use of Adrenalin Chlorid.

FRENCH, THOMAS R., Brooklyn, N. Y., (*Brooklyn Medical Journal*, February, 1905.) Inflammation began with a high grade of inflammatory activity in the fauces without edema, followed the next day with loud and increasing laryngeal stridor and edematous swelling of the epiglottis, arytenoid cartilages and aryepiglottic folds, with a temperature of 102°, respirations 27.

The treatment was a free application every hour of a 1-5000 solution of adrenalin chlorid by means of a tuft of cotton wound upon a curved applicator. By the end of the fifth application the laryngeal stridor had quite disappeared. The

applications were continued for several hours, the house physician sitting by the bedside of the patient the entire night. On the following day the edema had nearly disappeared, and although there was considerable congestion and infiltration of the tissues the lumen of the larynx was practically normal. Recovery after this was uneventful.

Dr. French thinks that this solution is capable of controlling edema of any mucous surface which can be readily reached with a cotton applicator or a spray from an atomizer. Where the swelling extends below the glottis, it is doubtful if the solution could be applied successfully except by intra-tracheal injections. A low tracheotomy would probably also have to be performed. *Richards.*

Examination of the Nasopharynx by Indirect Touch, Aided by Explorers.

COURTADE (*Arch. Int. de Laryn.*, Jan. and Feb., 1905.) The majority of cases do not permit posterior rhinoscopy. Digital examination, valuable as it is, is open to the following objections:

1. The space is too small in very young children to permit it, while in adults and children from 15 to 16, the vault is too deep to allow the finger to reach it.
2. The examination is so disagreeable that it does not grant sufficient time for thoroughness as to size and seat of the adenoid growth.
3. Only one side of the pharynx can be reached by the examining finger and repetition is not desirable.
4. Disinfection of the hand is necessary and requires time in clinic practice.
5. Bites of the finger are always possible. Courtade has, accordingly, devised "explorers" (nature not given) of varying sizes which he claims removes all these objections.

He lays especial stress on the ability of the examiner to carefully map out the exact situation of the growth.

Harris.

IV.—LARYNX.

Energy of Singing.

PROF. ZAARDEMAKER (*Netherlands Laryng., Rhin. and Otol.*

Society) proceeds from a supposition of Rayleigh, according to which, under very favorable conditions, the acoustic energy equalizes the consumed energy. A well-known singer sang in the aerodromograph in the Utrecht' laboratory. The air consumption for a certain song was 33 c. cm. a sec., for a staccato 50 c. cm. a sec. If the medium pressure in the trachea is 14 cm. water height (Roudet), the energy-consumption is for the song 0.45 mega-erg a sec., and 0.98 mega-erg a sec., for the staccato (a mega-erg is a quantity of energy equal to 1-42 gramcalory). The air coming from the mouth is supposed to possess no more energy, which is allowed, as a current can hardly be demonstrated and its energy does not surpass half an erg. *Blaauw.*

A Case of Trachael Syphylis.

Posthmus Meyjes (*Netherlands Laryng., Rhin. and Otol. Society*) saw a 59-year-old carpenfer, who gradually had become thin and oppressed with muscular action, swollen feet at night. His deceased wife had ten children, 8 of which died under one year, and 2 miscarriages. Lues denied. The dyspnea is audible and visible, the jugulum sinks in, the larynx does not move; the voice is husky. Heart, lungs and kidneys normal; a hard liver, margin palpable; pulse strongly arteriosclerotic, also the abdominal aorta. A large, scaling, suspicious papule on the back of the left hand. The cause of the dyspnea was found to be a scarlet tumefaction, nearly annular, under the rima glottidis, extending over nearly 2 c. cm. within the trachea. A narrow slit, the size of half the glottis, is left for respiration. The tumor gives a solid impression and is painless. Antiluetic treatment and rest diminished the dyspnea somewhat, although the stenosis remains. Dilatation with von Schoetter's tubes gave little result; the dyspnea increased. Cricotomy and high tracheotomy grade of inflammatory activity in the fauces without edema, were done under local anesthesia, while oxygen inhalations were of much benefit against the dyspnea. The speech remained intelligible with the canula. Patient received sublimate injections. Four weeks later the canula could be removed. The stricture had disappeared except a small prominence at the left side wall. The internal therapy was continued. It was also peculiar, that notwithstanding the strong dyspnea the larynx remained motionless, the typical sympton of stenosis within the trachea as described first by Gerhardt.

Dr. Brat advised Bleyer's tubes for such cases, as they could

be worn during the night. Dr. Muyderman gave the history of an analogous case of subchordal tertiary syphilis.

Blaauu.

Demonstration of a Cured Case of Radically Operated Carcinoma Laryngis.

Dr. Burger (*Netherlands Laryng., Rhin. and Otol. Society*) showed a patient, 63 years old, whose entire larynx was removed on Dec. 28, 1900. Patient is healthy and free from return; the trachea was sutured to the skin, the pharynx had been obliterated. Patient respires through his tracheal fistula, which remained wide open. Laryngscopically, the free part of the epiglottis can be seen, nothing more. Patient had an instrument wherewith to bring the expired air from the tracheal fistula through the nose into the mouth; he did not like it for speaking. He can only speak with a little esophageal air, very indistinctly.

Dr. Burger then showed a case of double sided suppuration of the frontal sinus, operated after Kuhnt. Dr. Vermey made an opening, size of a five-cent piece, in the anterior wall, followed by curetting and drainage on August 20, 1894. The wound was closed after 2 to 5 months. Then, repeated polypi formation, headache and suppuration of the nose. Burger operated on Dec. 29 last, found the opening, made nearly ten years previous, the same, granulations were present, which did not bulge out. The outer wall was removed, then a large communication with the other sinus was found, which necessitated the removal of the anterior wall of this one. A large part of the left sinus was replaced by a large ethmoid cell, which contained mucus and was removed entirely. On the left side a large communication with the nose was present; on the right side the ethmoid was perforated and a strip of gauze put in toward the nose. The wounds were closed, except over the right inner corner of the eye, where a drainage tube was left. Six weeks later, this opening also had closed. Suppuration of the nose had stopped on February 1st. Small polypi were removed from the ethmoidal cavity on March 30th, just one month later. The unbearable headache had disappeared. Burger is satisfied with the cosmetic result. Where the drainage tube lay, a sinking in of the skin is found. Burger considers it of importance for the future to close the entire external wound while making a large communication of the anterior part of the ethmoid with the nose, because it

is impossible to fill the most inferior, median part of the cavity with the soft parts of the forehead. A cavity remains here thus, which needs drainage toward the nose. Conservative operations are insufficient, because the cavity can not be overlooked.

Dr. Struycken advised paraffin injections made not too long after the operation, which improve the cosmetic result.

Dr. Moll had also a good cosmetic result after removal of the anterior and inferior wall. Dr. Burger had the same in a case of a small cavity with nice result; the cavity in the above related case was too large. *Blaauw.*

A Case of Carcinoma Laryngis.

H. VAN ANROOY (*Netherlands Laryng., Rhin. and Otol. Society*) was consulted at the beginning of April, 1903, by a man, who had complained of his voice for six months. He was 46 years old, had been free from diseases, also from lung affections and syphilis. Neither swallowing nor respiration gave trouble. On examination, the entrance of the larynx was found so narrow, that only a very small part of the vocal cords and, with phonation, of the swollen false cords could be seen, and it was amazing that no respiratory difficulties were present. The slow development of this somewhat uneven infiltration of the epiglottis, ligamenta aryepiglottica and regio arytenoidea, alone could explain the absence of stenotic symptoms. Condition the same for 6 weeks. In the beginning of June, the left arytenoid cartilage did not show movement nor did the left vocal cord. The absence of pain and of any lung process, and the local picture excluded tuberculosis. Neither iodid of potassium nor mercury had any effect. Prof. Pel was consulted in the beginning of June, and he also found it a very interesting case and thought it not improbable that it was a very slow growing carcinoma. Iodid of potassium was continued with inhalations of a weak tannin solution. Patient staid away till November; the dyspnea had increased, he looked pale and weak, and a stridor was plainly perceptible. The aditus laryngis was now a narrow slit; the epiglottis, the posterior laryngeal wall and the side parts, which stood out in both sinus pyriformes, all were much thickened and swollen, so that inspection of the larynx was impossible. At the left side of the larynx a small gland could be felt and the thyroid cartilage was somewhat sensitive on pressure. Tracheotomy had to be performed; patient died 24 hours later, suddenly:

no autopsy allowed. Inspection of the larynx revealed a deep ulcus under the epiglottis; a microscopic examination showed this to be a carcinomatous. *Blaauu.*

The Action of the Crico-Thyroid Muscles.

E. E. BARTH, Sensburg, (*Archiv. für Laryng. und Rhinol.*, VOL. xiii., No. 1.) The crico-thyroid muscle usually contracts in such a manner as to draw up the cricoid cartilage to the lower margin of the thyroid. In order to accomplish this, the thyroid cartilage must necessarily be fixed. The fixation of the thyroid cartilage is always a relative one, being dependent upon the fixation of the hyoid bone. If the muscular apparatus, which fixes the hyoid bone, relaxes, the thyroid cartilage is thus drawn down to the cricoid, by the action of the crico-thyroid muscle. The hyoid bone follows this movement of the thyroid cartilage, and comes forward simultaneously. By the movement of the thyroid cartilage and the hyoid bone downwards and forward, the sagittal diameter of the hypopharynx, and the distance between the posterior half of the base of the tongue and the palate, is enlarged. This enlargement improves the conditions which favor resonance and conduction of sound waves, which pass upward from the larynx. In consequence of the relaxation of the muscles governing fixation of the base of the tongue, phonation is accomplished with a less expenditure of strength. The production of tones with a thyroid cartilage directed downward, favors the hygiene of the sound apparatus, and is to be employed as a curative measure in functional disturbances of the voice. It is of fundamenetal importance in teaching singing and speaking to produce the sounds with relaxation of the fixators of the hyoid bone, and with corresponding lowering of the thyroid cartilage. *Goodale.*

Intubation, Including a Report of Some Unusual Cases.

RUSSELL SHURLY, Detroit, Mich., (*Journal American Medical Association*, Oct. 29, 1904). To intubate properly the patient should be held as if hung from the head; the tongue drawn well forward. In cases of spasm of the glottis, the tube should be held in place until the patient takes a deep inspiration. No larger tube than necessary should be used. Force is only to be condemned. Hemorrhages, syncope, false passages and other traumatisms are unnecessary. Gentle, firm pressure may be required to force the tube through a sub-

glottic obstruction into position after the obturator has been removed.

Where antioxin is given, the tube is usually worn from two to three days. In private practice the string should be left on the tube.

In private practice he advocates early intubation with removal of the tube at the beginning of the fourth day.

Richards.

Hemorrhage of the Larynx.

JOHN E. RHODES, Chicago, (*Journal American Medical Association,* Oct. 29, 1904). In treatment of this condition, rest of the voice is the most important item. Internal remedies are to be used for the quieting of any cough, and remedies like ergot and stypticin for the local effect on blood vessels. Astringents may be used topically, such as mild solutions of silver nitrate, perchlorid of iron, alumnol and the zinc salts. The author has found adrenalin 1-1000 to hasten the absorption of exudates. No harsh methods are to be used, and only the mildest of applications, as special stimulation is not required.

Abstracts of all the cases reported in literature accompany the article. *Richards.*

Cancer of the Larynx.

SIR FELIX SEMON, London, (*Medical Record,* November 5, 1904,) thinks that the still prevailing notion that malignant disease of the larynx is from the first attended by grave constitutional symptoms, ought to be completely eradicated, and that the attention of the profession should be drawn to the fact that there are no more promising cases for radical operation than those in which the disease is at first manifested by nothing else than by extended hoarseness occurring without any apparent cause in middle-aged and elderly persons.

The clinical diagnosis should be made at the earliest possible moment and should be arrived at from the history and subjective symptoms of the case, from laryngoscopic examination and from accessory circumstances of importance so far as these will aid. As, however, this method is by no means perfect and occasionally mistakes occur in the practice of those most experienced, this clinical diagnosis ought, whenever possible, to be confirmed before any radical operation is undertaken, by the intra-laryngeal removal and microscopic exami-

nation of a fragment or fragments of the new growth. The patient should, previous to this examination, give his consent to immediate radical operation provided the microscope confirms the clinical diagnosis. As the microscope is by no means infallible, if its evidence be negative or inconclusive, the intra-laryngeal removal and microscopic examination of fragments should either be repeated, if necessary, several times, or if the clinical symptoms do not warrant postponement, exploratory thyrotomy should be undertaken.

The intra-laryngeal method is unsuitable for the radical removal of malignant new growths of the larynx.

Subhoyoid pharyngotomy is applicable only in a very small number of cases.

Thyrotomy, if undertaken in suitable cases and sufficiently early, and if properly performed, is an ideal operation in intrinsic cancer of the larynx.

Hemi-laryngectomy comes into question only when it is found after opening the larynx that thyrotomy will not suffice. The tributary lymphatics may be removed even if apparently not diseased.

Total laryngectomy is to be reserved for extrinsic, and for those cases of intrinsic cancer in which both sides of the organ are affected and where the disease has proceeded too far to be eradicated by milder measures. It should be accompanied by removal of the laryngeal lymphatics on each side of the neck.

The statistics reported by Sir Felix are exceptionally good, twenty thyrotomies having been performed, with or without removal of small fragments of cartilage in cases of undoubted malignant disease of the larynx, with nineteen recoveries; two quite doubtful recurrences, and one death. In one of the recurrences the patient has remained perfectly well, and in the other it was found that the operation had not been extensive enough and a second thyrotomy was performed within two months from the first. After the second operation the patient has remained well.

He is convinced from his personal experience that no recurrence need be feared if the patient remains well for a full year after operation. Of the seventeen patients who permanently recovered from the operation, three died several years afterwards from affections altogether unconnected with the original disease. The remaining fourteen are living and well. *Richards.*

An Interesting Case of Tuberculosis of the Larynx.

GRIFFIN, HARRISON E., New York, (*Medical Record,* December 17, 1904.) This patient had three attacks of laryngeal tuberculosis, every attack running into the third stage, namely that of ulceration, with rapid recovery every time he left New York City. The internal treatment consisted of a creosote preparation and one-twentieth of a grain doses of morphin in tablet form, repeated every one to five hours to keep the cough in abeyance.

The author thinks the throat should be treated as little as possible; that any violent or rough spraying into the larynx tends to inflame and spread the ulceration. He believes in keeping the larynx quiet until the ulceration is healed. He has found morphin in small doses, often repeated, with an occasional large dose to quiet a paroxysm of coughing, to be less objectionable than any other drug. *Richards.*

Nomenclature of Congenital Stridor

MASSEI (*Arch. Inter. de Laryn.,* Jan. and Feb., 1905.) According to Massei the majority of the lesions described under the name of congenital stridor are wrongly named. Spasm of the larynx of centric origin, compression of the thymus cicatricial bands, laryngismus stridulus (idiopathic and the result of adenoid vegetations), nasal reflexes and all similar conditions are not rightly called congenital stridor.

Stridor has a characteristic sound which resembles the croaking of a frog—heard only on inspiration. It can disappear when respiration is quiet and persists during chloroform anesthesia but ceases some after intubation. It appears at birth or a few days after and lasts from eight to twelve months. It may disappear spontaneously; although painful it produces no grave disturbance of respiration. Two theories alone can account for it—either a central lesion or congenital defects in the larynx vestibule. The author inclines strongly to the latter. Sutherland and Lack have succeeded in seeing the larynx in several cases.

Massei has practiced the touch examination in eleven cases and confirms the results of their examination. In all there was a malformation of the vestibule of the larynx. The epiglottis was poorly developed on its free side—resembled a larye nut—was scarcely movable. The aryteno-epiglottic folds were short and with the two arytenoids approached the median line. The stridor proceeds not from the malformed

epiglottis but from the coming together of the aryteno-epiglottic folds. All his eleven cases confirm this and permit two facts to be clearly drawn.

1. There exists an actual congenital malformation of the larynx, limited to the region of the vestibule, capable of interfering with respiration.

2. A faulty conformation of the laryngeal orifice consisting of a narrowing of it to a crack suffices to bring on a characteristic sound known as *congenital stridor.* *Harris.*

V.—MISCELLANEOUS.

A Case of Struma Vasculosa.

ZAALBERG (*Netherlands Laryng., Rhin. and Otol. Society*) saw a girl of 20 years, who had found her neck becoming thicker after a fright, together with ocular changes. The diagnosis "Morbus Basedowii" was easily made; the exophthalmus was more pronounced on the left side. The patient felt a murmur in the neck; a finer motion, which was easily recognizable as a fremissement with the fingers, was found with the pulsation. A marked systolic sound was heard on auscultation. No obvious tremor; the skin became rough, and wrinkled and thicker in some places, chiefly on the knuckles; no changes visible with the laryngoscope.

Prof. Pel warned against treating morbus Basedowii with thyroid preparations; they are as oil to the fire; rest and a bland diet are the chief treatment; bromides are sometimes useful; galvanisation of the sympathetic in the neck is often very effective. Dr. Kan related a case, where Dr. De Bruine Groenevelt removed the entire sympathetic in the neck on the left side with much success; the exophthalmus on that side has as good as disappeared and the left radial can be felt no more *Blaauu.*

The Diagnosis of Aneurysma Aortae.

PROF. P. K. PEL (*Netherlands Laryng., Rhin. and Otol. Society*) says that Traube discovered in 1860 the left sided recurrens paralysis accompanying aneurism of the aortic arch; he finds, however, that the Oliver-Cardanelli symptom (1878), which has higher value, is less generally known. The

trachea must first be distended by lifting of the larynx (cart. cricoidea) with thumb and index of the right hand, while the ulnar side of the hand rests on the thoracic wall; the patient must keep his head a little backward and to the left and keep the mouth shut. Pel observed the rising and falling movement of the larynx, isochronal with the heart beat, also when blood in the aneurismatic sac was coagulated. Sometimes it can be seen at a distance. Four patients were shown with this symptom, while in only one was the left vocal cord paralyzed.

Blaauu.

Chromophotography of the Vocal and Sound-vibrations.

STRUYCKEN (*Netherlands Laryng., Rhin. and Otol. Society*) made use of the free fall to exclude all noise while experimenting; the membrane or median border, which takes over the sound-vibration, is photographed with a 100-times enlargement. The limits of the images are then sharp to ¼ m. m., so that amplitudes of 2.5 m. are still clear. The light line perpendicular to the vibration-surface is 1-10 m. m. broad, the velocity with which the negative falls is 1700 m. m. a second; the acceleration can be measured from two succeeding waves and the correction easily applied. With concentrated sunlight photographs are easily taken; 17,000 moment-photographs are taken a second, so that tones with only 4000 vibrations a second are demonstrable. The results show (1) that the earlier curvatures of gramaphone and phonograph are much more complicated than the ones of the speaker, (2) that observations of periods, etc., must be right. Struycken found also that taking a number of curves of plain tones, the vibration-numbers of which are related as 1-2-3-4-5, etc., and combining these, the new curve shows the geometrical peculiarity—if the phases are taken equal—that always an abscissa can be found, which divides it into two parts, which form each phantom. If the phase is removed ¼, then an ordinate can be drawn with the same result. This does not obtain with the vocal curves which are still analyzed according to Fournier's problem, and Hermann neglected, as without much significance, the phase-moving in his second publication. *Blaauu.*

The Effect of Radium Irradiation.

W. POSTHMUS MEYES (*Netherlands Laryng., Rhin. and Otol. Society*) demonstrated patients treated with radium. (1) Miss V., suffered with nasal lupus, externally in different foci.

internally visible as lupus granulations, two centimeters deep in the right nasal duct. The usual therapy had little success. From March 15 to April 14, patient was irradiated daily with 25 m. gr. radium bromid (20,000) units placed in the nose. Began with 2 minutes, later 10 minutes. From April 14-24 treatment twice a week for 20 minutes. During the first days, some hours after the irradiation, a slight excitation for sneezing, and slight dullness in the head. After 8 treatments, the external nodes began to vanish, while the granulations in the nose began to flatten and pale only after 3 weeks. End of April, the nose was apparently cured externally, with small red patches, with internal progress. Treatment continued. (2) Patient suffered from lupus of the right nasal wing ex- and internally for 3 years, introitus nasi of the right side full of granulations as far as the aperture, somewhat less on the left side. The septum is perforated. For 4 months the nose-point was affected. The usual therapy had no result, and the process was progressing. From March 22 to April 8 daily treatment, from 2-10 minutes, in the right nostril. The result was flattening of the external foci, while the internal granulations become flat and pale, also on the left side. From April 8 to 22 treatment twice a week, 10-20 minutes. Steady amelioration, the nose point is apparently cured, the nose wing on the way; the formation of crusts, before treatment very bothersome, has decreased. (3) Miss.—suffered from double-sided nasal lupus internally for years, the nose point is changed for about a year into a thick nodulous mass. On the face, good sized, scattered foci of lupus. The usual treatment had very little success. From March 29 to April 5, daily treatment for 5-10 minutes, in the right nostril. From April 1 to 4 with two radium tubes. Swelling and redness of the nose point increased, also the obstruction in the right nose; on the right side exacerbation of an old dacryocystitis. The reaction passed off in 4 days. April 11, 15 and 19 illumination for 10-20 minutes, again followed by some reaction. The effect was only a small reduction of the external lupus foci. Two ozena patients also were treated; after one week diminution of the secretion especially in the treated side of nose. The illumination began with 2 minutes, increased to 9 minutes. The local reaction was very little, only some dullness in the head in the evening. Conclusion: do not use radium daily and for a short time but sporadically and until a definite reaction occurs, then wait a good while.

Dr. Delsaux advised the use of adrenalin on the mucous

membranes because the activity of radium increases; he had important improvements in two cases of carcinoma laryngis and a complete cure of cancer of the external nose after 10 seances of 5-10 minutes. Dr. Brat had small success with lupus, good with carcinoma. Dr. Posthumus Meyes stated that radium can be examined with the electroscope; his cases, which showed an intense reaction after a longer period, were treated with pure radium; the dilution according to Curie, which he used, is innocuous. Dr. Delsaux described the simple way of dosage with an aluminium disc, which gradually thickens; an opening closed with a silver plate forms the zero point of the instrument, being non-transparent. The thickness of aluminium is determined, the shade of which agrees with that of the silver plate and the penetrating force of the rays is estimated according to the number of layers of aluminium, which let the light pass.

Blaauu.

Reflex Apnea and Cardiac Inhibition in Operations on the Respiratory Tract.

W. G. B. HARLAND, Philadelphia, and WILLIAM HARMAR GOOD, Philadelphia, (*Journal American Medical Association*, Oct. 22, 1904.) Reflex inhibition of heart and respiration is caused in the following way: Afferent impulses, following irritation of the trifacial and sensory branches of the vagus (superior laryngeal and pulmonary), are carried to the cardio-inhibitory center in the medulla. This center is thrown into greater activity, and strong inhibitory impulses are sent to the heart. At the same time the respiratory center is so acted on as to cause a cessation of respiratory movements, until the accumulated carbon dioxid again drives it into action. The consequent inflation of the air vesicles of the lungs then reflexly lessens the activity of the cardio-inhibitory center, (*Sitz, d., k. akad. Wissensch*, Vol. lxiv., p. 11) and in this way inhibition is overcome.

Reflex inhibition is noted in operations on the nose. In operations on the septum quite frequently reflex inhibition will cause a patient to suddenly feel faint and "lose his nerve," although, the tissues being cocainized, he experiences no pain. Doubtless many of the deaths occurring in primary anesthesia can also be attributed to this cause.

The rhinopharynx is very sensitive to inhibition. In the removal of adenoids a marked slowing of the pulse almost invariably occurs when the instrument—forceps, currette or

finger—is introduced behind the soft palate. Particulars are given which illustrate this.

It has been shown by Crile that irritation of the larynx, forcible dilatation of the pharynx and violent traction on the tongue will each cause reflex inhibition and even death.

Electrical irritation of the pulmonary vagal fibers has caused marked cardiac inhibition.

This condition of reflex inhibition cannot be prevented in every case. The only drug given internally that theoretically is of value is atropin, since it paralyzes the peripheral cardio-inhibitory ganglia in the heart, thus preventing cardiac inhibition. It must, however, be administered early and in full dose to insure absorption before ether is given or operation begun.

A preliminary spray of 1% cocain, with 1 to 10,000 adrenalin chlorid, sprayed into the nose and throat lessens the tendency to reflex inhibition. The treatment varies with the severity of the symptoms. Temporary withdrawal of the cause of irritation usually suffices. In severe cases atropin, even if given hypodermically, is too slow, as ten or fifteen minutes will elapse before it is absorbed. The prone position, artificial respiration, and gentle traction on the tongue are to be at once resorted to, followed by inflation of the lungs by mouth to mouth insufflation or with a bellows, keeping the lungs distended for five seconds, and repeating until the patient is revived. *Richards.*

Periodic Hemorrhage of the Upper Air Passages.

BAUMGARTEN (*Arch. Int. de Laryng.*, Jan. and Feb., 1905.) Up to recently we were acquainted only with periodic hemorrhages from the nose. All other hemorrhages were supposed to proceed from the lungs. The laryngoscope has changed all this. Puech stated in 1863 that vicariocs hemorrhage occurred 32 times from the stomach, 25 times from the breast, 24 times from the lungs, 18 times from the nose. Of the 24, from the lungs, we would recognize many today by means of the laryngoscope as arising in the upper air tract. Menstruation is to be regarded as a depletion of the organism through the uterus. Certain very vascular areas exist there which cannot resist a lateral pressure. The phenomenon does not occur if there is any defect in involution or otherwise in the uterus as when the veins are too deeply seated or when the lateral pressure is not sufficient. If there are vascular points

on mucous surfaces elsewhere, as in the nose, the hemorrhage will occur at the point of least resistance.

In 250 cases of periodic bleeding, 40 came from the nose. Baumgarten divides such hemorrhages into the following classes:

1. Those occurring before the beginning of menstruation. These did not occur in young girls so much as in older women, very anemic, where menstruation had been retarded. It came from the nose, was unilateral, moderate in severity, and was followed in a few weeks by normal menstruation. It is not wont to be repeated more than three or four times.

2. Those occurring in place of menstruation. Such cases are rare. There is usually some uterine trouble. They proceed most commonly from the nose and are unilateral and of moderate severity as a rule.

3. Those occurring during menstruation: (a) before menstruation; most cases of periodic hemorrhage belong to this class. It proceeds the normal flow directly. Sometimes the subjects are anemic and at other times they are healthy women. Menstruation is delayed a few hours. The bleeding was usually a unilateral epistaxis of moderate severity—but other sources have been detected as from the larynx. (b) Those occurring directly during menstruation. These also are often seen and come most often from the nose.

4. Those occurring during pregnancy. These proceed from the nose and only during the first half of the pregnancy. The first time it is slight but the second or third time more severe.

5. Those occurring during the menopause. They seem to occur more frequently at this period. Most often where the change of life is early. At this time a dry catarrh of the nose and throat is common and tends to favor the hemorrhage. Epistaxis is most frequent and is wont to last longest—sometimes a year. The attacks vary in severity even in the same person. Dry catarrh associated with crusts greatly aggrevates the intensity of the hemorrhage. *Harris.*

BOOK NOTICES.

Traité Elementaire et Practique des Maladies de la Gorge, du Pharynx et du Larynx par le Dr. E. J. Moure, chargé du Cours de Laryngologie d'Otologie et de Rhinologie à la Faculté de Médicine de Bordeaux, Paris, 1904, Octave Doin.

In the introduction of this latest work of Prof. Moure, he states that it is in effect a second edition of his book which appeared in 1890, to which he has added chapters on the pathology of the tonsils, palate, pharynx and lingual tonsils. To consider it from this view-point alone is unfair for although the first work was a creditable one in the light of the knowledge of the time, the last is much superior in every particular.

The anatomy, descriptive, histologic and embryologic is specially clear and comprehensive and the pathology is in keeping with the latest investigations. The chapters devoted to the tonsils are well conceived and presented, and the illustrations are most effective. Four hundred pages are devoted to the larynx, forming a treatise, ample for any general practitioner and sufficiently extensive to justify the attention of a laryngologist.

Saunders' American Year-Book for 1905.

The American Year-Book of Medicine and Surgery for 1905. A Yearly Digest of Scientific Progress and Authoritative Opinion in all branches of Medicine and Surgery, drawn from journals, monographs, and text-books of the leading American and foreign authors and investigators. Arranged, with critical editorial comments, by eminent American specialists, under the editorial charge of George M. Gould, A. M., M. D. In two volumes. Volume I, including General Medicine; Volume II, General Surgery. Two octavos of about 700 pages each, fully illustrated. Philadelphia and London: W. B. Saunders & Co., 1905. Per volume: Cloth, $3.00 net; half Morocco, $3.75 net.

The Surgical Volume of this well established Year Book con-

tains the ear, nose and throat section, under the editorship of D. Braden Kyle and J. Leslie Davis.

Fifty-eight pages are devoted to this department, affording a fair opportunity to detail its progress during a year. The authors have accomplished the object most satisfactorily without sacrificing important advances on the score of brevity. In fact they have presented in a well-written text a serviceable treatise which should be read by all laryngologists and otologists.

The Modern Mastoid Operation.

By Frederick Whiting, A. M., M. D., Professor of Otology, Cornell University Medical College; Aural Surgeon to New York Ear and Ear Infirmary; Surgeon to St. Bartholomew's Clinic, etc. Illustrated by twenty-five half-tone and twenty-three key plates made from original drawings. P. Blakiston's Son & Co., Philadelphia.

This very excellent work of 353 pages gives in a detailed form the symptomatology, pathology and surgical treatment and after treatment of suppurative mastoiditis. The plates are of exceptional merit and the whole abounds with practical hints, gleaned from the author's personal experience.

The first chapter deals with the history of mastoidectomy from its inception to the classical operation of Schwartze. His own operation which he calls, "The complete mastoid operation," differs from the classical one in two features; first, it is a flap operation, and secondly, it requires the complete exenteration of the mastoid cells, whether apparently diseased or not. He regards the disease as an acute suppurative osteomyelitis. His technique is as follows:

A curvilinear incision is made one quarter of an inch behind the auricle. A second incision is made perpendicular to this, at the lever of the meatus, one inch in length, directly backwards. The flaps are reflected and the periosteum is elevated with as little injury as possible. A groove is made with a gouge, starting at the supermeatal triangle as far down as the tip, skirting the brim of the bony meatus. The spongy bone is scooped out with a curette and then grooves parallel to the first are made, followed by scraping out of the spongy

bone with the curette. The antrum is next opened, and then the mastoid tip is removed by the rongeur.

The next step is the removal of the cell lying over the sigmoid groove. The author details the treatment necessary if the sinus is injured. The cells at the posterior root of the zygoma are removed and the wound cleansed with a 1-5000 solution of sublimate. The angles of the wound are closed with sutures. A piece of fenestrated rubber tissue is placed in the bony cavity and upon this is loosely packed strips of iodoform gauze. Over this are placed loose layers of iodoform and sterile gauze and cotton, and then a bandage. The dressing is changed at the end of 24 to 36 hours, with the omission of the rubber tissue. The gauze must be placed loosely. The author considers at length the various incidences that may arise during healing.

The author claims that there is little or no deformity by this method, in spite of the extensive excavation of the operation. He gives full credit to Gruening who modified the Schwartze operation by removing the pneumatic spaces and diploic cells at the posterior root of the zygoma.

This historical portion of the work is particularly instructive, and the typographical features and illustrations are of the highest modern standard. Altogether the book exhibits the author's operation upon the mastoid in successive steps interestingly and lucidly described and logically correllated.

Atlas and Epitome of Diseases of the Mouth, Pharynx and Nose.

By Dr. L. Grunwald, of Munich. Second edition, revised and enlarged. Authorized translation from the German. Edited, with alditions, by James E. Newcomb, M. D., Instructor in Laryngology, Cornell University Medical College; Attending Laryngologist to the Roosevelt Hospital, Out-Patient Department, and to the Demilt Dispensary, New York City. With illustrations on 42 lithographic plates, and 41 figures in the text. Philadelphia and London: W. B. Saunders & Company, 1903.

As in other volumes of Saunders' Hand Atlases, the salient feature of the work is an abundance of excellent lithographs. In the present instance, the plates are faithfully executed and make the best possible substitute for direct clinical observation and instruction.

In this, the second edition, a number of alterations from the first have been made. The text, in addition to descriptions of the plates, contains complete case histories of the patients from whom the plates were taken. Several histologic plates have been added.

The last half of the book is devoted to a succinct discussion of diseases of the mouth, pharynx and nose, including anatomy, physiology, pathology and treatment. A few of the simpler surgical procedures are described.